26 301

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EDITED IN ENGLISH AND GERMAN

BY

DR. H. KNAPP
OF NEW YORK

AND

DR. C. SCHWEIGGER
OF BERLIN

IN CONJUNCTION WITH

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CONTENTS OF VOLUME XIII.

NUMBER I.

1. Remarks on the Development of Glaucoma. By Dr. A. Mooren, Düsseldorf. Translated by M. L. King, M.D., New York . . 1
2. Contributions to the Etiology and Treatment of Orbital Cellulitis. By Dr. Hermann Pagenstecher, of Wiesbaden. Translated by Dr. A. Schapringer, New York 17
3. Ophthalmoscopic Appearances after Retro-Ocular Hemorrhage. By Dr. Hermann Pagenstecher, of Wiesbaden. Translated by Dr. A. Schapringer, New York 22
4. Injury of the Eye by Lightning. By Dr. Hermann Pagenstecher, of Wiesbaden. Translated by Dr. A. Schapringer, New York . . 26
5. A Case of Abscess of the Brain with Double Optic Neuritis, Caries of the Right Orbit, and Orbital Cellulitis; with Autopsy. By Geo. S. Norton, M.D. 30
6. Eczema Simplex—Ametropia its Cause. By S. O. Richey, M.D., Washington, D. C. 34
7. A Case of Bi-Temporal Hæmianopia. By H. F. Hansell, A.M., M.D., Philadelphia 36
8. A Case of Exophthalmus, Affecting Both Eyes, Without Pulsation—Episcleritis—Spontaneous Recovery. By Dr. Cornelius Williams, St. Paul, Minn. 41
9. Case of Sparkling Synchysis, Kerato-Iritis, and Poisoning by Sulphate of Duboisia. By F. M. Wilson, M.D., Bridgeport, Conn. . 44
10. A Glioma of the Right Eye Spreading by Metastasis through Many Periosteal Centres. By Julian J. Chisolm, M.D., of Baltimore, Md. (With an engraving.) 47
11. Epiphora from Congenital Atresia of the Puncta Lacrymalia—Successful Operation for its Relief. By Swan M. Burnett, M.D., Washington, D. C. 53
12. Boroglyceride in the Treatment of Conjunctivitis Trachomatosa (Arlt), Ophthalmia Contagiosa of Asylums. By Charles S. Turnbull, M.D., Philadelphia 57
13. Some Recent Theories Regarding the Pathogeny of Sympathetic Ophthalmia, Viewed from a Macroscopic Standpoint. By Samuel Theobald, M.D., Baltimore, Md. 62

14. Blindness from Thrombosis of the Retinal Vessels in Facial Erysipelas. By H. Knapp, M.D. (With two chromo-lithographic plates.) 83
15. Indications and Contra-Indications of Jequirity. Communication to the Editor of the ARCHIVES OF OPHTHALMOLOGY. By L. de Wecker, Paris 107
16. Jequirity. By Dr. Hasket Derby, Boston 115
17. Jequirity. By Dr. J. J. Chisolm, Baltimore, Md. 118
18. Experience with Jequirity at the Manhattan Eye and Ear Hospital, New York. By David Webster, M.D., New York . . . 121
19. Jequirity (Abrus Precatorius) in the Treatment of Granular Lids. By Le Roy Pope Walker, M.D., New York 137
20. Clinical Observations on the Use of Jequirity in Trachoma. By H. Knapp 145
21. The Infusion of Jequirity in Granular Lids and Pannus. By Dr. Emil Grüning, New York 157
22. Notes on Jequirity. By Dr. C. J. Kipp, Newark, N. J.; Dr. H. W. Williams, Boston; Dr. Geo. Strawbridge, Philadelphia; Dr. Wm. F. Norris, Philadelphia; Dr. W. W. Seely, Cincinnati; Dr. U. H. Brown, Syracuse; Dr. J. F. Hotz, Chicago 164
23. Notice 170
24. Miscellaneous Notes 170

NUMBER 2.

1. A Contribution to the Pathological Anatomy of Retinal Hemorrhages. By Dr. J. Thalberg, St. Petersburg, Russia. Translated by Dr. A. Schapringer, New York 173
2. The Pathological Anatomy of Primary Sarcoma of the Iris. By Dr. J. Thalberg, of St. Petersburg. Translated by Dr. R. O. Born, New York. (Plate i., vol. xiii.) 179
3. The Comparative Frequency of Eye Diseases in the White and Colored Races in the United States. By Swan M. Burnett, M.D. . 187
4. Secondary Septic Ophthalmitis. By P. H. Mules, M.D., Manchester, England 201
5. The Unequal Contraction of the Ciliary Muscle. By S. J. Bumstead, M.D., of Decatur, Ill. 208
6. A Case of Sympathetic Ophthalmia: Operation on the Exciting Eye, with Restoration of Vision in Both. By John F. Fulton, Ph.D., St. Paul, Minn. 213
7. Description of an Eyeball Affected with Coloboma of the Iris and Choroid. By Dr. Da Gamo Pinto. Translated by Dr. M. L. King, New York. (Plates ii. and iii., vol. xii. German edition.) 216
8. A Foreign Body in the Vitreous, Removed by Means of a Magnet. By Dr. E. L. Holmes, of Chicago 238
9. The Indications and Contra-Indications of Jequirity. Second Communication to Dr. H. Knapp from Dr. L. de Wecker . . . 241
10. Further Observations on the Use of Jequirity. By H. Knapp . 247

11. On the Pathological Anatomy of Congenital Coloboma of the Choroid and Iris. By Dr. J. Thalberg, of St. Petersburg. Translated by Jas. A. Spalding, M.D., Portland, Maine . . . 253
12. A Case of Congenital Fistula Sacci Lachrymalis. By Wheelock Rider, of Rochester, N. Y. 263
13. An Unusual Tolerance of a Foreign Body in the Fundus of the Eye. By Wheelock Rider, of Rochester, N. Y. 264
14. Appendix to the Paper on Blindness from Facial Erysipelas. By H. Knapp. (Page 83 of this volume.) 265
15. Systematic Report of the Progress of Ophthalmology During the First Quarter of the Year 1883. By H. Magnus, Breslau; C. Horstmann, Berlin; and A. Nieden, Bochum; with the coöperation of C. E. Fitzgerald and Ferguson, Dublin; E. Marckwort and P. von Mittelstädt, Antwerp; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc. Translated by Dr. F. E. D'Oench, New York . . . 267

A.—Dr. A. Nieden. Iris, 267; Choroid, 268; Glaucoma, 271; Sympathetic ophthalmia, 273; Refractive media, 274; Vitreous body, 277; Retina and functional disturnbance, 278; optic nerve, 281; Injuries, foreign bodies (parasites), 283; ocular affections in constitutional diseases, 284.

16. Report on the Twentieth Annual Meeting of the American Ophthalmological Society, held at the Grand Hotel, Catskill Mountains, July 16 and 17, 1884. By H. Knapp 287
17. Miscellaneous Notes 294

NUMBERS 3 AND 4.

1. A New and Convenient Test for Color-Blindness. By Dr. Richard Hilbert, of Königsberg. Translated by Dr. Cornelius Williams, St. Paul, Minn. 297
2. A Case of Sudden Amaurosis Followed by Homonymous Superior Hemianopia. By Theodore Wiethe, M.D. Translated by Dr. A. Schapringer, New York 301
3. Report on 1,420 Cataract-Extractions Performed at the University Ophthalmic Hospital, in Munich, by Prof. v. Rothmund, from April 1, 1868, to April 1, 1883. By Drs. O. Eversbusch and J. Pemerl, in Munich. Translated by Drs. M. L. King and C. Zimmermann, of New York 311
4. Two Cases of Upward Strabismus. By E. L. Holmes, M.D., Chicago 392
5. A Case of Prolapse of the Vitreous Through a Needle-Puncture of the Cornea. By. E. L. Holmes, M.D., of Chicago . . . 394
6. A Case of Amblyopia from Menstrual Hemorrhage in Typhoid Fever; Recovery of Sight. By Dr. Cornelius Williams, St. Paul, Minn. 397
7. Cases of Trachoma in the Negro Race. By Dr. James L. Minor . 400
8. On Cocaine and its Use in Ophthalmic and General Surgery. By H. Knapp 402
9. Systematic Report on the Progress of Ophthalmology During the Second and Third Quarters of the Year 1883. By H. Magnus,

Breslau; C. Hortsmann, Berlin; and A. Nieden, Bochum; with the coöperation of C. E. Fitzgerald and Ferguson, Dublin; E. Marckwort and P. von Mittelstädt, Antwerp; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc. Translated by Drs. F. E. D'Oench, Jas. A. Spalding, and C. Zimmermann 449

A.—Dr. H. Magnus. Text-books, monographs, treatises on general bibliographical and historical subjects, 449; Statistical papers, 450; General pathology, diagnosis, and therapeutics, 453; Instruments and remedies, 455; anatomy, refractive media: retina and choroid, 456; Optic nerve and central organs, 457; Comparative anatomy, 458; General physiology, 458; Retina and central organs, 459; Color-perception, 460.

B.—Dr. C. Horstmann. Anomalies of refraction and accommodation, 461; Lids and surroundings of the eyes, 463; Lachrymal apparatus, 465, Muscles and nerves, 467; Orbit and adjacent cavities, 468; Conjunctiva, cornea, sclerotica, anterior chamber, 471.

C.—Dr. A. Nieden. Iris, choroid, glaucoma, 489; Sympathetic ophthalmia, lens, 491; Retina and functional disturbances, 494; Optic nerve, 498; Injuries, foreign bodies (parasites), 499; Ocular affections in general diseases, 501.

10. Systematic Report on the Progress of Ophthalmology During the Fourth Quarter of the Year 1883. By H. Magnus, Breslau, and C. Horstmann, Berlin. Translated by Drs. F. E. D'Oench and C. Zimmermann 507

Text-books, monographs, treatises on general bibliographical and historical subjects, 507; Statistical papers, 510; General pathology and diagnosis, 510: Therapeutics, 511; Instruments and technical contrivances, 513; Remedies, 515; General anatomy and embryology, 515; Vitreous and lens, retina and choroid, 516; Optic nerve and central organs, 517; Comparative anatomy, 518; General physiology and physiology of the lachrymal organs, 521; Retina and central organs and color-perception, 522; Errors of refraction and accommodation, 524; Lids and surroundings of the eye, 524; Lachrymal apparatus, 527; Muscles and nerves, 527; Orbit and neighboring cavities, 528; Conjunctiva, cornea, sclera, anterior chamber, 530; Iris, 535: Choroid, 536; Glaucoma, 537; Sympathetic ophthalmia, 538; Lens, 540; Vitreous body, 542; Retina, optic nerve, and functional disturbances, 543; Injuries, foreign bodies (parasites), 546; Affections of the eye in general diseases, 548.

11. Miscellaneous Notes 553

12. Errata 555

13. Index 557

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

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In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or copies for reviewing, to one of the above named reporters, or to the editors or publishers of the Archives, according to their convenience.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunites for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

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CONTENTS OF VOLUME XIII., NUMBER I.

1. Remarks on the Development of Glaucoma. By Dr. A. Mooren, Düsseldorf. Translated by M. L. King, M.D., New York . . 1
2. Contributions to the Etiology and Treatment of Orbital Cellulitis. By Dr. Hermann Pagenstecher, Wiesbaden. Translated by Dr. A. Schapringer, New York 17
3. Ophthalmoscopic Appearances After Retro-Ocular Hemorrhage. By Dr. Hermann Pagenstecher, of Wiesbaden. Translated by Dr. A. Schapringer, New York 22
4. Injury of the Eye by Lightning. By Dr. Hermann Pagenstecher, of Wiesbaden. Translated by Dr. A. Schapringer, New York . 26
5. A Case of Abscess of the Brain with Double Optic Neuritis, Caries of the Right Orbit, and Orbital Cellulitis; with Autopsy. By Geo. S. Norton, M.D. 30
6. Eczema Simplex—Ametropia its Cause. By S. O. Richey, M.D., Washington, D. C. 34
7. A Case of Bi-Temporal Hæmianopia. By H. F. Hansell, A.M., M.D., Philadelphia 36
8. A Case of Exophthalmus, Affecting Both Eyes, Without Pulsation—Episcleritis—Spontaneous Recovery. By Dr. Cornelius Williams, St. Paul, Minn. 41
9. Case of Sparkling Synchysis, Kerato-Iritis, and Poisoning by Sulphate of Duboisia. By F. M. Wilson, M.D., Bridgeport, Ct. . 44
10. A Glioma of the Right Eye Spreading by Metastasis through Many Periosteal Centres. By Julian J. Chisolm, M.D., of Baltimore, Md. (With an engraving.) 47
11. Epiphora from Congenital Atresia of the Puncta Lacrymalia—Successful Operation for its Relief. By Swan M. Burnett, M.D., Washington, D. C. 53
12. Boroglyceride in the Treatment of Conjunctivitis Trachomatosa (Arlt), Ophthalmia Contagiosa of Asylums. By Charles S. Turnbull, M.D., Philadelphia 57
13. Some Recent Theories Regarding the Pathogeny of Sympathetic Ophthalmia, Viewed from a Macroscopic Standpoint. By Samuel Theobald, M.D., Baltimore, Md. 62
14. Blindness from Thrombosis of the Retinal Vessels in Facial Erysipelas. By H. Knapp, M.D. (With two chomo-lithographic plates.) 83
15. Indications and Contra-Indications of Jequirity. Communication to the Editor of the ARCHIVES OF OPHTHALMOLOGY. By L. de Wecker, Paris 107
16. Jequirity. By Dr. Hasket Derby, Boston 115
17. Jequirity. By Dr. J. J. Chisolm, Baltimore, Md. 118
18. Experience with Jequirity at the Manhattan Eye and Ear Hospital, New York. By David Webster, M.D., New York . . . 121
19. Jequirity (Abrus Precatorius) in the Treatment of Granular Lids. By Le Roy Pope Walker, M.D., New York 137
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22. Notes on Jequirity. By Dr. C. J. Kipp, Newark, N. J.; Dr. H. W. Williams, Boston; Dr. Geo. Strawbridge, Philadelphia; Dr. Wm. F. Norris, Philadelphia; Dr. W. W. Seely, Cincinnati; Dr. U. H. Brown, Syracuse; Dr. J. F. Hotz, Chicago 164
23. Notice 170
24. Miscellaneous Notes 170

NOTICE TO CONTRIBUTORS.

THE editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

1. As original communications the ARCHIVES can accept only such papers as have neither been printed nor are intended to be printed in other journals. If a preliminary communication on the subject of a paper has been published, the author is requested to state this in the letter accompanying his manuscript. It is understood that contributors to these ARCHIVES and editors of other periodicals, will make no abstracts of the original papers published in this journal without giving it due credit for the same.

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VOL. XIII. No. 1.

ARCHIVES OF OPHTHALMOLOGY.

REMARKS ON THE DEVELOPMENT OF GLAUCOMA.

By Dr. A. MOOREN, Düsseldorf.

Translated by M. L. King, M. D., New York.

IN the supplement to Hirschberg's *Centralblatt für Augenheilkunde*, for the year 1881, C. Webster Fox and W. A. Brailey describe a case in which optic neuritis was complicated by acute glaucoma, the intense pains accompanying the latter rendering an enucleation of the globe necessary. On examining the eye the papilla was found distinctly swollen, and the lamina cribrosa pressed back. The retinal veins were dilated, varicose, and engorged, but the arteries were not larger than usual. Both observers are of opinion that in this case the optic neuritis caused an acute inflammation of the walls of the central vessels, followed by a venous thrombosis. This inflammation had advanced anteriorly, particularly in the loose episcleral tissue and along its vessels, and at last, by passing along the ciliary veins, had caused an acute inflammation of the muscular fibres of the ciliary body.

In the same place, reference is made to an observation of Hirschberg, who in December, 1874, diagnosed a partial atrophy of both optic nerves, coming on after an optic neuritis, in a woman fifty years of age. This patient again presented herself on June 18, 1877; the tissue of the papilla was white and cloudy on both sides, and traversed by fine vessels; in the vicinity of the optic disc several spots were seen, in which pigment changes had taken place. The arteries were very narrow, being about half the size of the

veins. The subjective symptoms were dizziness and weakness of memory. On seeing the patient again, October 9th, Hirschberg concluded that acute glaucoma was present as a complication in both eyes. Besides the circum-corneal injection, the corneæ of both eyes were smoky, the entrance of the optic nerve scarcely visible, the pupil dilated ad maximum, and the tension on both sides was + 1. This attack of acute glaucoma had been preceded for several days by prodromi, such as severe pains in the frontal and temporal regions in the evening. A double iridectomy was performed the following morning, and in the evening of the same day the corneæ were clear, the anterior chambers refilled, and all pain had disappeared. The next morning the optic papilla was plainly visible, and the old atrophic discoloration could be seen, there being no sign of an excavation. No hemorrhages could be seen in the fundus, and the tension was normal.

In the Transactions of the American Ophthalmological Society for 1882, we also find an observation by Kipp, in which an acute attack of glaucoma (both eyes) was followed by a meningitis with severe fever, occipital pains, vomiting, etc., resulting in the death of the patient, who was fifty-one years of age. While in Kipp's case only the connection between the cerebral trouble and the glaucoma is indicated, in the cases reported by Fox, Brailey, and Hirschberg, there can be no doubt as to the coëxistence of optic neuritis and glaucoma. I prefer to call attention to the statements of other observers, rather than to mention cases of my own practice, in order to leave no room for the insinuation that I am biassed in favor of a certain pathogenetic view, thus bringing things into connection with each other which may only be the result of accident.

That optic neuritis does occur with glaucoma we may consider as proven, by the cases mentioned above. We only regret that in Brailey's and Hirschberg's cases the causes of the optic neuritis are not mentioned. From my own observations I must conclude that the glaucomatous affection always appeared as a complication in cases of optic neuritis which are of central origin. It would

be justifiable to consider such forms of optic neuritis as belonging to the degenerative variety, because the changes are of the same kind as are seen in a peripheral nerve which is separated from its nutritive centre.

If the central source of nutrition of the nerves, the gray substance, or in the spinal cord the anterior pyramidal tracts be destroyed, the same pathological processes are observed as are seen in nerves artificially isolated. For this reason this form of optic neuritis is almost exclusively seen in encephalitic disease, multiple sclerosis, transverse myelitis, etc. When any of these diseases are present, it frequently happens that years may elapse before the whole series of nutritive ganglion cells are destroyed (and with them their corresponding nerve-fibres), presenting to the eye of the observer the whitish reflex of atrophy of the optic nerve. Even in this advanced stage of atrophy, symptoms of inflammation may appear around the optic disc, without at the time causing any marked changes in the general health.

In order to produce these inflammations it is only necessary for the atrophy of the retinal vessels to reach a certain point, thus causing an increased proliferation of connective tissue, which will give to the optic-nerve entrance the character of a neuritis. A large number of the cases observed by me were remarkable because of the extraordinary tenuity of the retinal vessels. These symptoms seem to be about the same as those found by Cohnheim, when he cut off the blood-supply from the tongue by ligation of the arteries. Without a preceding acute inflammation, the decreased blood-supply had caused such a change in the walls of the vessels, within forty-eight hours, as resulted in an inflammation of all the tissues supplied by them. As has been shown by Rumpf and Kuhnt, the appearance of this neuritis is not infrequently caused by molecular degeneration of the marrow of the single nerve-fibres and the influence of the lymph in enlarging the axis-cylinders by imbibition. This stage of atrophic degeneration, characterized by turbid swelling of the ends of the optic nerves and proliferation of connective tissue, is most frequently complicated by acute glaucoma, without being followed by the development of an excavation.

In another series of cases, caused primarily by the same class of diseases, patients complain only of a progressive impairment of vision, but surprise us by the presence of glaucomatous excavation. Their pupil is of normal size, the iris reacts to light as usual, the aqueous humor is clear, and the tension is not increased,—nothing, in fact, to make us suspect the presence of glaucoma. Their color-perception is almost always disturbed, and a central scotoma is not infrequent. Such cases, as is well known, are described by von Græfe under the name of amaurosis with excavation of the optic disc. Many of them develop into a true glaucoma, some do not change their character but are followed by a steady contraction of the field of vision, and at last result in total loss of sight.

During the past summer, within a period of three weeks, I saw three patients who had had serious disturbances of vision in consequence of menorrhagia. In the first case, there was atrophy; in the second, latent optic neuritis; and in the third, glaucomatous excavation of the optic nerve. The latter case was that of an unmarried peasant forty-five years of age, who, until two years ago, had excellent vision. In consequence of a great loss of blood, she lost the entire sight of one eye, and the vision of the remaining eye had become so dim that she could not read the coarsest print. In this eye the field of vision was contracted to near the point of fixation, and was of the shape of a parabola. The disease, no doubt, was of the glaucomatous variety from the start, because the patient gave the characteristic description that, from the beginning of the disease, she had seen all the prismatic colors when looking at the flame of a lamp at night. At the time of examination the eyeballs were very hard, nothing being wanting to complete the picture of a glaucomatous atrophy of the optic nerve, with the characteristic cupping.

All clinicians of experience agree, that if an inflammatory uterine trouble or protracted menstrual disturbances be followed by weakness and trembling of the lower extremities, cold feet, tickling of the soles, a beginning myelitis may be expected,—especially if these symptoms be complicated by

shooting pains in the ovaries, pain in the back on pressure, etc. It is not rare to find that this set of symptoms often leads to a uni- or bi-lateral optic neuritis without a myelitis being developed. The same symptoms apparently, in another case, may be followed by symptoms of a progressive atrophy of the optic nerve, while in a third case, perhaps, the destruction of the optic-nerve fibres is caused by a glaucomatous excavation; in the latter case, the patient may for years have only complained of an intractable hyperæsthesia of the retina.

While, in the cases just mentioned, the same unfavorable influence is seen to affect the optic nerve in such a variety of shapes, we are told by pathologists that there is a great difference between an atrophic and a glaucomatous excavation. One of the most competent observers—A. Alt—expresses himself in regard to this difference as follows (page 155, of his "Lectures on the Eye"): "While simple atrophic excavation is flat, and only reaches to the lamina cribrosa, which, as stated, remains in its normal position, we find in a case of glaucomatous excavation that the fibres of the lamina cribrosa are compressed and forced backward, often behind the outer surface of the sclerotic. The nerve-fibres of the papilla, which are pressed aside, are atrophied, and the optic nerve behind the lamina cribrosa shows the conditions of atrophy after interstitial neuritis."

Mauthner thinks, that distinctive features are furnished by the margin of the excavation in the glaucomatous process; he thinks the margin is always sharply defined, whereas the atrophic excavation never presents a sharp edge. From a clinical standpoint, it is certainly not to be denied that some cases present these distinctions, but we must also acknowledge that the transition from atrophy of the nerve to glaucomatous excavation is sometimes so gradual, that the boundary-line cannot be drawn with exactness. For a person who is accustomed to consider a glaucomatous excavation as a symptom of a local disease, the result of increased intra-ocular pressure, for example, it is difficult to believe in a new causal connection of these conditions. Even Mauthner, who has emancipated himself

entirely from the pressure theory, considers a glaucoma following cerebral disease, as an accidental complication. We cannot discard the idea of a connection between glaucomatous excavation and cerebral diseases, for there are many patients who, after having had a glaucomatous attack, suffer, sooner or later, from severe cerebral disease or mental troubles.

From clinical observation we certainly find that the degenerative forms of neuritis, of central origin, appear at one time as an atrophy of the optic nerve, and again with the symptoms of glaucomatous excavation of the disc. Those cases of glaucomatous excavation which appear without any of the symptoms of increased intra-ocular tension, at least prove that the excavation in such cases is not the result of intra-ocular pressure. Even if this variety of disease be complicated later on with inflammatory glaucoma, the excavation would still be considered the result of a disturbance of the nutrition of the optic nerve totally independent of the glaucoma.

Again, we may often see an optic disc, already atrophied in consequence of encephalitis or myelitis, become opaque and swollen, and the eye suddenly present all the symptoms of an acute inflammatory glaucoma. When under these circumstances an iridectomy is performed only to relieve the inflammatory symptoms, we are, after the vitreous has cleared up, surprised to find absolutely no excavation of the disc, although there could be no doubt as to the increased intra-ocular pressure.

This is proof enough that in all these cases the presence or absence and the breadth and depth of the excavation are not dependent in any way on the degree of increase of the intra-ocular pressure.

It is well known that A. v. Graefe originally considered this excavating process as a variety of disease of the nerve, which should not be confounded with the inflammatory glaucoma.

Later on, for the term amaurosis with excavation of the optic disc, he substituted Donders' nomenclature of glaucoma simplex because he believed that the inflammatory

symptoms so often complicating these diseases in their later stages only substantiated the theory of the celebrated physiologist of Utrecht.

Although the glaucomatous excavation may not exist as a true optic neurosis, but a result of some nutritive disturbance, either of the central nervous system or at least of that part of the optic nerve lying between the chiasm and the lamina cribrosa, yet it is still justifiable to make a clinical separation of these processes, the pathogeny of which is so different, and the pathology of which presents so many phases.

If this difference had been kept in view an immense number of iridectomies would not have been made, and v. Graefe and nearly all his pupils would have been spared many a disappointment as regards the result of this operation in glaucoma simplex.

In Band viii., 2, p. 308 of *Graefe's Archiv*, Schmidt mentions a case, the history of which is too characteristic, to be passed over, because it illustrates those mistakes which we have all been making. The patient was a female, who presented all the symptoms of an excavation due to pressure. A diagnosis of glaucoma simplex was made and an iridectomy proposed, but not performed, as the patient died of intercurrent pneumonia. On autopsy it was found that both optic nerves, in their whole extent, were thin and flattened. Microscopically the atrophy could be followed beyond the chiasma into the tractus; this typical glaucomatous excavation of the disc was therefore the result of an atrophy of the optic nerve. Such cases are not often found in the literature of the subject, but in the experience of ophthalmologists they are indeed very numerous. In this case iridectomy would have been as useless as it is in all cases of glaucomatous disease of the nerve which do not originate in the eye but in the centre of nutrition of the optic nerve. Certainly there are cases of glaucomatous excavation of the disc, in which an iridectomy or sclerotomy is necessary, especially when acute inflammatory symptoms appear. The operation may be of temporary benefit, but only by diminishing the eyeball tension;

the real disease however is not stopped by this operative interference; therapeutic measures alone are of use, if the disease be such as is amenable to treatment, as for instance syphilitic myelitis. Some months ago I treated a Texan lady who, before leaving her home, had had the symptoms of an acute inflammatory glaucoma, which had been treated by a double iridectomy. Some weeks later her vision became much worse. On her way to Europe she consulted Dr. Knapp in New York, who, at the time, found no increase of intra-ocular tension.

When this patient came to Düsseldorf she was able with one eye to count fingers at a distance of a few feet by eccentric lateral fixation, and with the other eye to read letters of Jäger No. 20. I made a diagnosis of latent optic neuritis, and put her under a course of treatment by inunction. The result was such that in October, within two months, she was able to read Jäger No. 1 fluently, after her presbyopia had been corrected.

This was a brilliant result therapeutically, but it was so only because this was one of the few cases in which the cause of the disturbance could be removed. Even the most brilliant therapeutic results will not alter the fact, that in the glaucomatous excavation of the optic nerve, or in the excavation of glaucoma simplex, with or without inflammatory symptoms, we have to deal with some anomaly of nutrition of the optic nerve.

Even in the purest variety of inflammatory glaucoma there are numerous observations proving that the size of excavation is in no direct relation to the degree of intra-ocular tension which may have existed. We often meet with cases in which there is a high degree of functional disturbance, with considerable intra-ocular tension, without any sign of an excavation; in other cases there is very slight decrease in vision, with such a slightly contracted field, that the latter can only be made out by lamplight, and on examination we are surprised to find a very deep excavation.

More remarkable still are those cases which, at the time of the iridectomy, show no signs of an excavation, but after

a number of months or years, intra-ocular tension being very slight in the meantime, we are astonished to find a well-marked excavation.

Increase of eyeball tension may result from decreased elasticity of the sclera, impeded resorption, disturbed filtration, and increased secretion. It may be caused partly by the condition of the vascular system and partly by the influence of the nervous system.

Coccius first called attention to the fact that an unyielding sclera may of itself produce glaucoma. The degree of scleral elasticity determines the increase of tension of the lobe, and the functional power of the optic nerve and retina. In children where the elasticity of the arterial system is normal, the use of atropine never causes an increase of intra-ocular tension. But if this same drug be used for some time in a patient with symptoms of senile involution of the arterial system, it is certain that the intra-ocular tension may be increased to such a degree that at first we think it is a true glaucoma; but on closer examination we find it is not a true glaucoma, and if the atropine be stopped, all these severe symptoms disappear spontaneously. I have convinced myself of the correctness of this fact, in many cases of corneal abscesses in old people. In one case which I published in 1874, atropine had been used for a whole year, the patient being in the prime of life, without the apparently glaucomatous eyes becoming truly glaucomatous; for in four weeks the symptoms had disappered and the patient had good vision without any operation being done.

The conditions are altogether different if an eye disposed to glaucoma be exposed to the action of atropine, even for a short time. The already existing predisposition to glaucoma is increased so rapidly that it results in an acute inflammatory attack. I have seen such conditions brought about by the use of atropine twice, or even once. Although various observers have described glaucoma as coming on in young persons, even in children below ten years, my present experience leads me to assume that in all such cases there was some previous disease of the vessels, which disturbed the normal condition of transudation, thus causing

the disease which is comparatively rare at this age. To decide this question definitely it would perhaps be well to have sphygmographic tracings of the vascular system made of all cases examined.

Although at the present time I am not able to furnish positive proof, I believe that the predisposition to vascular disease, caused by the intermarrying of relations, may also cause the development of glaucoma. It seems to me, that the presence of such a large number of cases of glaucomatous disease among the Jewish population of Galizia, as has been found by the Vienna ophthalmologists—especially Mauthner—would point to some such cause. The Jewish race, as such, has no more predisposition to this disease than any other branch of the European population. Whenever I saw this disease, it seemed to be caused by the more or less frequent marriages of near relatives; it must not be denied that the slight barriers the Jewish law offers to such marriages may have some influence on the question.

The hereditary tendency to glaucoma, which has been observed at times in the various members and branches of the same family, may also be caused by the disturbance of transudation, resulting from the tendency to vascular troubles.

Paralysis, or even diseased functional activity of the cerebro-spinal system and the vaso-motor nerves depending on it, may, under certain circumstances, have a reflex action on the intra-ocular efferent channels. By this hypothesis only, can I explain three cases in which acute glaucoma followed a severe cerebral disturbance. Twice it was unilateral, and once bilateral. In my case-books I find a large series of symptoms which appeared after destruction by heat of some part of the skin, either as capillary retinal apoplexies, retinitis, choroiditis, or as choroido-retinitis. Combustion of the limbus corneæ, as has been done experimentally by Schöler, very often produces glaucoma, but not, as I formerly believed, by destroying a part of the avenues of exit of the intra-ocular fluids, but infinitely more by interference with the apparatus of filtration situated in some place of the uveal tract, especially in the ciliary body, the

function of which is disturbed by the decreased vitality of the vessels.

All deleterious influences liable to damage the vitality of the walls of the intra-ocular vessels may, as possible causes of inflammation, increase the resistances to filtration. Judging from this standpoint, it is easily explainable that the intra-ocular circulatory disturbances associated with uterine disease, may be the cause of a glaucoma, just as in syphilitie disease the proliferation of connective tissue by removing the lumen of the vessels brings about the same result. Only in two cases have I found the above-described condition of things in syphilis ; in both cases the disturbance of vision was bilateral, and treatment by inunction caused a surprising increase in acuteness of vision, and enlargement of the field. These results alone, prove that the indications were correctly interpreted. I am willing to admit that the proportion of such cases only forms a small fractional part of the whole number of cases of glaucoma. Development of glaucoma from uterine disease is relatively much more frequent. Jacobson's denial of this causation rests on his personal views. Although the pathogenetic interpretation of these facts is at varience with general opinion, I still uphold them, though I acknowledge that I will gladly accept a better explanation of the symptoms, if one is offered.

The assumption of a more or less marked change in the vessels as one of the first requisites for the development of glaucoma, will lead us to consider the frequent capillary hemorrhage in the retina as the final result of the pathological changes in the vessels. I do not here refer to those capillary apoplexies taking place at the time of an iridectomy ; these are simply caused by the great change in intra-ocular pressure which takes place. It is also often found, that while there are no hemorrhages during the iridectomy, they often occur two to three weeks, or even as many months, later, without any apparent cause, destroying within a few days the vision which was preserved by the operation. In one case, these retinal hemorrhages appeared so extensively, a long time after the operation, that, on account of the pain they caused (the patient was very old) I

was for some time in doubt whether it would not be best to enucleate both eyeballs. These facts prove that the retinal hemorrhages may be a result, as well as a cause, of glaucoma. Mauthner is wrong when he assumes that glaucoma apoplecticum has no relation to the true glaucoma. The severity of the symptoms accompanying the spontaneous appearance of this variety of disease does not prove that it is a separate form by itself. The occasional absence of an excavation does not render this view erroneous, because in the cases mentioned, where glaucoma had developed with the usual excavation, the disease showed just the same symptoms as other cases in which there had been no excavation of the optic disc.

If in apoplectic glaucoma iridectomy is of no use, it is not because of the peculiar nature of the disease, but because the extensive degeneration of the vessels prevents an equalization of the processes of diffusion, cause and effect thus uniting to give the disease so intractable a character. It has been well shown that in nearly all forms of glaucoma, the transudations are distinguished by their small percentage of albumen, and by their lack of power to coagulate, while in glaucoma apoplecticum the symptoms are more of the true inflammatory kind, as is shown by the relatively large proportion of white corpuscles present. But this fact is not in intrinsic opposition to the other forms of glaucoma, for the transition from the watery transudations to true inflammatory exudations is gradual, as in all pathological processes, and is dependent on the extent and severity of the disturbances in the vitality of the vascular endothelium. The terrible trigeminal neuralgiæ, which, so to speak, are inseparable from apoplectic glaucoma, are caused partly by the extensive changes in the vessels and partly by the great tension of the globe, which alone, leaving out of consideration the other symptoms, is enough to prevent the escape of the intra-ocular transudations.

Neither in apopletcic nor in other forms of glaucoma do we find perverted nervous action lead directly to inflammation of the vessels; it changes indirectly by processes of diffusion the vitality of the vascular walls, either increasing transudation or decreasing absorption.

A trigeminal neuralgia, as such, need not necessarily have any influence on the development of glaucoma. As proof of this, we may mention those neuroses caused by slight contusions of the cornea, or by the presence of precipitates of lead, lasting a long time and being quite severe without being followed by glaucoma.

Even if influences which, under certain circumstances, might cause an attack of glaucoma, are of psychic origin, there is no reason to believe that there is a psychic glaucoma, any more than there is glaucoma of cerebral, dental, or uterine origin.

The irritating influences from the trigeminus may have such origin, but they do not cause the glaucoma, but by rapidly increasing the tension cause the already existing circulatory disturbances to assume an acute inflammatory character. The circulatory disturbances in the anterior part of the choroid, which preceded the appearance of the attack, may be caused by circumstances which have nothing in common with the origin of the trigeminal irritation. From my previous observations, I must say that I think the uterine influences may be the common origin of the choroidal circulatory disturbances, and of the irritating influences from the trigeminus.

From the experiments of A. Weber[1] it follows that the glomeruli of the ciliary processes alone, are the source of the intra-ocular fluid, and that the course of the fluid is as follows: It passes from the vitreous body at the edge of the lens to the posterior chamber, then through the pupil into the anterior chamber, passing out of the eye at the angle of the anterior chamber, this point being the limbus corneæ.

Any thing, therefore, which impedes the movement of this fluid, at any part of its course, may assist in increasing the intra-ocular tension. As Ad. Weber has observed, it makes no difference whether the obstruction be in the vitreous, or in any part of the uveal tract, or if it be caused by the presence of circular synechiæ or whether it be due to some resistance situated in the sclera alone.

[1] Ueber die pathologischen Veränderungen, welche dem Glaucom vorausgehen, etc. London Inter. Congress, 1881.

The whole of the blood contained in the capillaries is not carried off by the venous radicles, but, because of the intra-ocular pressure, passes by transudation into other channels. It is apparent that if this transuded fluid be not carried off rapidly enough, it will accumulate and exert a pressure on all the neighboring vessels, thus bringing about a more or less total compression according to the delicacy of the vessels. Therefore any increase in the quantity of fluid in the eyeball must react, in a marked manner, on the intra-ocular vessels, because they have, as Ad. Weber has remarked, an unyielding support, against which they are pressed. This support would be formed by the choroid as far as the base of the ciliary muscle and by the vessels of the iris obstructing the sinus of the anterior chamber. But where, it may be asked, do we find the primary cause of the increased tension? From a physiological point of view there is no doubt that the primary pressure on the circulation comes from the heart, being greatest in the aorta and gradually diminishing toward the capillaries. In contrast to this, the pressure in the veins is greatest in the venous radicles, gradually decreasing toward the junction of the vena cava and the heart.

In the vena cruralis of a sheep the pressure was 11.4 *mm*, above that of the atmosphere, while in the vena anonyma sinistra the pressure fell even below that of the atmosphere. The pressure caused by the cardiac impulse will never cause a glaucoma to develop, because there are no facts at all which would support such a theory. When there is an extensive atheromatous degeneration of the arteries, the heart may, it is true, cause some prominent pathological symptoms, but its participation is only of a secondary character. The cause of the development of glaucoma is to be found principally in the disturbed conditions of filtration, in the vessels designated by A. Weber, comprising the course taken by the intra-ocular transudations. It is not possible to conceive of a permanent increase in intra-ocular tension without a previous change in the vitality of the endothelium. The peculiar character of glaucoma is given it by the participation of nervous influence, the latter by its action on

already diseased vascular walls causing increased transudation.

In a previous publication I have already indicated that a glaucoma, which may have been operated on in the most skilful manner, will, sooner or later, result in total loss of sight, if the trigeminal neuralgiæ which are present, do not disappear after the operation. This fact, which is of great importance as to prognosis, is easily understood, because the influence of the nervous irritation on the circulation of vessels already diseased, by increasing or diminishing it, brings about conditions favorable to the extension of the disease. The operation in itself cannot restore the diseased vessels to the normal condition, but only removes those disturbances of increased secretion which are the result of the disease of the vessels or of the retarded removal of the transudations.

A. v. Graefe tried to refer all the symptoms of glaucoma to pressure, and under these circumstances, if an excavation was present, it was but natural to assume that its depth depended on the degree of pressure present. We now know that an excavation is an indication of a disturbance of nutrition, and that the degree of pressure has but very little to do with its formation. Undoubtedly pressure does exert a certain influence, although Mauthner has taken great pains in trying to disprove it. The originator of the pressure theory may have over-estimated the effect of increased intra-ocular pressure on the formation of excavations, yet it remains unintelligible to me how the supposition of an excavation being the result of disturbed nutrition of the optic-nerve entrance justifies Mauthner in declaring my comparison of Graefe to Kepler as devoid of foundation. Increased intra-ocular pressure does exist in glaucoma, and the fact of having devised an operation which destroys its influence on the functional energy of the optic nerve and retina will always remain a triumph, because in this operation theory is combined with practical results. The endeavor to belittle v. Graefe's merit in reference to glaucoma simply because he did not lay the same stress on the separate symptoms as we do at the present day, reminds me of

the lectures of a teacher who never became tired in demonstrating to his pupils how roundabout was the course taken by Columbus when trying to discover America. The principle of increased pressure, from which standpoint v. Graefe interpreted all the symptoms of glaucoma, still holds good, although we now know that increased intra-ocular pressure in itself is not the primary cause of glaucoma, but is the result of some fundamental disease depending on circulatory disturbances.

Düsseldorf, Nov. 12, 1883.

CONTRIBUTIONS TO THE ETIOLOGY AND TREATMENT OF ORBITAL CELLULITIS.

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Translated by Dr. A. Schapringer, New York.

IN his exhaustive monograph on diseases of the orbit Berlin enumerates the following cases of orbital cellulitis: injuries, the extension of local inflammation in the orbital cavity or its vicinity, metastatic processes, and finally colds giving rise to an idiopathic form of this complaint. My own experience leads me to doubt the existence of this idiopathic form of orbital cellulitis and to believe that the cases which have been described under this head were produced by some of the causes first enumerated. In most instances they were probably due to the extension of inflammation from a focus which had escaped the attention of the observer.

I have been inclined to this view ever since I observed the following case. The patient, himself a physician, had suffered from a considerable distension of the antrum when fourteen years old. This was cured by perforation of the hard palate. The fistula thus produced had been kept open for twelve years, when he was suddenly taken with a severe attack of orbital cellulitis of the same side. No cause could be assigned for this attack. The pains were intense, and swelling of the lids and conjunctiva as well as the protrusion of the eyeball were very marked, reaching their maximum on the third day, after which the symptoms decreased and the patient recovered completely at the end of eight days. There was no suppuration. The treatment consisted

in warm poultices, hypodermic injections of morphia, and laxatives. No examination of the condition of the antrum was made at the time. Nevertheless I am convinced that the affection of the orbital tissue was due to infection from this source, which was so liable to become inflamed through particles of food remaining in it, or through the spreading of inflammatory processes in the mucous membrane of the neighboring cavities.

I have more accurate notes of the following three cases in which the causative element was made out unmistakably.

CASE I.—On September 8th, 1879, I was called to see a boy nine years of age who presented well-marked symptoms of orbital cellulitis of the left side. There was no history of injury. Upon examination of the orbital walls and the oral cavity no obvious abnormality could be detected. The last upper molar of the left side had been plugged a year before. For the last few weeks he had been unable to chew on that side, and in the evening of September 5th he was taken with a violent toothache on the same side. A dentist who was consulted on the following day stated positively that the plugged tooth was healthy and that the pain was probably due to a new tooth developing behind the last molar. In the evening of the same day the eyelids began to swell. During the night he became feverish, the swelling of the lids increased, and the eyeball began to protrude. The affected parts were painful, but the toothache ceased. During the following day all the symptoms grew worse. In the evening of this day (September 8th), owing to the application of warm poultices, the pain began to subside. I saw the patient on the same day for the first time. The eyeball then protruded to the extent of about ¼ inch; there were marked chemosis, limited mobility, and diplopia in every direction. The ophthalmoscopic appearances were normal and he could read Jaeger No. 1. I ordered warm poultices and a laxative. During the course of September 9th, 10th, and 11th, the swelling and proptosis continued to decrease, but on September 13th a relapse of these symptoms took place and vision became impaired to such a degree that he could read only Jaeger 14 with the left eye. I now insisted upon the extraction of the plugged molar, and the operation was performed the same evening under protest by the dentist. The next day the swelling of the parts decreased very noticeably. Upon examination of the tooth

the periosteal membrane lining the fangs was found to be slightly inflamed and the tips of the fangs were somewhat eroded. Two days afterward a circumscribed swelling could be made out in the cavity of the orbit, which pointed and was incised, September 19th. It discharged a moderate quantity of pus. In the meantime the swelling of the lids and the protrusion of the eyeball had entirely receded. A probe inserted into the incision penetrated to the depth of one inch. The abscess cavity was syringed every day with a one-per-cent solution of carbolic acid, under which treatment it healed at the end of five weeks.

I had an opportunity to (again) examine the patient three years later, when I found that the left eye had M = $\frac{1}{3}$, and that the visual acuity as well as the ophthalmoscopic appearances were normal. On the right side S was = $\frac{20}{20}$ with — $\frac{1}{60}$. The gap caused by the extraction of the last molar was still present, and the new tooth which the dentist had imagined to be developing had failed to make its appearance.

Case 2.—E. A., an upholsterer, twenty-seven years of age, was admitted to the institution under my charge on May 3, 1880, for orbital cellulitis of the left side, with marked protrusion of the eyeball. His statements were vague and unreliable ; so much, however, could be made out that the swelling, accompanied by pain, had begun two days before, and that in the night between April 30th and May 1st, he had had an attack of toothache, radiating into the face. This attack was caused apparently by taking cold. When asked whether he had not met with an injury lately, he answered that about three weeks ago a stone had been thrown against his left cheek, and that the cheek had swelled for four or five days. Upon admission the eyelids were swollen, very tense and very tender to the touch. When an attempt was made to separate them, a fold of the highly œdematous conjunctiva prolapsed. The eyeball itself protruded considerably. The cornea was slightly hazy and apparently compressed from above and below, presenting an oblong appearance, with the greater diameter in the horizontal direction. S = $\frac{20}{100}$, the visual field was narrowed concentrically, and diplopia existed. With the ophthalmoscope no other change could be detected except marked venous hyperæmia. Examination of the orbital walls did not elicit any abnormality, but upon inspecting the buccal cavity the left second upper molar was found to be carious. The treatment instituted consisted in warm poultices and laxatives.

On the following day, the symptoms having remained unchanged, I ordered the carious tooth to be removed, which was done in the course of the forenoon, but unfortunately it was thrown away before an examination of the roots was made. In the course of the afternoon the pains diminished, and from this time the swelling continually decreased. On May 6th the patient could move the eyeball. The proptosis also diminished. On May 7th he could raise the upper eyelid, and on May 13th he was discharged at his request, the eyeball having almost completely receded into its normal position. There had been no suppuration. $S = \frac{10}{10}$, visual field normal, retinal veins slightly congested.

Owing to the fact that the extracted tooth was lost, the connection between the affection of the orbital tissue and the dental caries could not be traced in this case as clearly as in the preceding one. The difficulty was increased by the insufficient account which the patient gave of himself. Still, the marked improvement and rapid cure which followed the removal of the tooth go far to prove a relationship of cause and effect. In the case detailed first I believe this relationship to have been proved beyond any reasonable doubt.

I will here insert the report of a case published in Wedl's "Pathologie der Zæhne" (1870, p. 170), because I think that it has escaped the notice of most ophthalmologists.

A woman, twenty-four years of age, was taken with a violent toothache in the right first upper molar. The right side of the face became swollen and also painful. The eyeball was protruded, and she soon noticed that she was blind on that side. The swelling pointed first at the inner, and later on at the outer canthus, and there was discharge of pus. The openings closed, but the general condition remained the same for three weeks, at the end of which she was admitted to the hospital. Upon admission the face was distorted, the lids were œdematous, and the skin had a livid hue. The right first upper molar was now extracted, together with several other carious teeth. The alveolar cavity of the molar was partly obliterated, and a probe introduced into it passed into the antrum. A large portion of the inner wall and of the floor of the orbit was found to be necrosed and was removed. The pupil, which had been immovable during the course of the disease, regained its mobility, but the lost eyesight did not return.

The same author also reports a similar case from the practice of Mr. Pollock. There was an intense inflammation of the maxillary region, invading the tissues of the orbit, caused by a diseased tooth. The power of vision was abolished. After extraction of the tooth the swelling subsided, but the eyesight remained lost.

C. Williams[1] reported a case of alveolar abscess, which had formed after the extraction of an upper molar, and burrowed under the zygomatic arch along the temporal muscles. Not being able to perforate the strong temporal fascia, the abscess found its way through the spheno-maxillary fossa into the outer and lower portion of the orbital cavity, and finally discharged through an opening formed near the outer commissure. There was marked exophthalmos and chemosis of the affected side. Incisions made in the temporal region were followed by rapid improvement.

These observations prove beyond doubt that inflammation of the orbital tissue may be caused by infection from a diseased tooth, the path of the infection being probably by the way of the lymphatics. In all cases of orbital cellulitis the oral cavity should therefore be carefully examined. The caution should, however, not be carried to extremes by extracting teeth without sufficient reason. Orbital cellulitis may also be caused by other sources than carious teeth, as the following case will show:

Case 3.—A house painter, aged twenty-four, came under my treatment June 26, 1881. The left eyeball protruded considerably, the lids were swollen, the motility of the globe was impaired, and he suffered much pain. The trouble had developed rapidly within two days. He had met with no injury. On inspection of the oral cavity the teeth were found to be sound, but there existed mucous patches. There was also a scar on the penis, and a general enlargement of the lymphatic glands. I ordered the inunction of five grammes of mercurial ointment twice a day. At the end of twelve days the proptosis had disappeared, and the patient was discharged from the institution. No pus was formed in this case either.

The complex of symptoms in this case was evidently caused by syphilitic periostitis of the orbit.

[1] "Dental Cosmos," 1867.

OPHTHALMOSCOPIC APPEARANCES AFTER RETRO-OCULAR HEMORRHAGE.

By Dr. HERMANN PAGENSTECHER, of Weisbaden, Germany.

Translated by Dr. A. Schapringer, New York.

RETRO-OCULAR hemorrhage is of rare occurrence, and the opportunity of making an ophthalmoscopic examination in such cases is still more rare. Hence, it is not to be wondered at, that only a few accounts of such examinations can be found recorded in literature. In some of the published cases the background of the eye was found to be normal, though the visual power was diminished.[1] In others, changes were found in the retina, which were caused mainly by disturbances in the circulation of the blood. Most of these cases are of traumatic origin, and therefore three elements will usually combine to produce a disturbance of vision, viz.: the direct violence upon the eyeball itself, the pressure of the extravasated blood upon the fibres of the optic nerve, and the disturbance of circulation caused by compression of the blood-vessels. In most cases it will be found difficult to determine the exact proportion contributed by each of these three elements toward producing the visual disturbance.

The case described here offered the rare opportunity of an early and satisfactory ophthalmoscopic examination, by the aid of which the cause of the visual trouble could

[1] Berlin, in *Graefe-Sæmisch's Handbuch*, Bd. vi., p. 572.

be clearly demonstrated. The first examinations of the case were made by Dr. von Hoffmann, now of Baden-Baden, who was at that time my assistant.

CASE.—The patient, a strong laboring man, while working with a circular saw, was struck upon the right eye by a heavy piece of timber, on Jan. 20, 1874. Fifteen minutes after the accident had occurred he presented himself at the institute under my charge, where the following condition was noted: There were considerable ecchymosis and swelling of both lids, the upper overlapping the lower. The skin was not broken, and the bony rim of the orbit was entire. The eyeball protruded about half an inch, but was completely covered by the lids. There was chemosis of the outer portion of the conjunctiva, whilst the inner portion was the seat of a few ecchymoses. The rest of the conjunctiva was pale; the cornea was transparent, but slightly hazy. The other refracting media were clear; the pupil was irregularly dilated, and did not respond to the influence of light. $S = \frac{15}{200}$. Upon ophthalmoscopic examination the retina was discovered to be shining white, like porcelain, completely hiding the underlying choroid. The white discoloration was most marked in the neighborhood of the optic disc and the macula lutea. The peripheric portions of the retina were still transparent. The blood-vessels were narrow, arteries and veins being equal in size; the latter, however, darker in color.

During the examination the patient suddenly complained of an obscuration of the field of vision on the affected side. A functional examination being immediately made, it was found that perception of light was completely abolished in the inner half of the visual field, and that only movements of the hand could be made out in the outer and central portions, more promptly in the former than in the latter.

The examination with the ophthalmoscope having been resumed, the retinal blood-vessels were found to have become still thinner. Those portions of the vessels which were contained within the boundaries of the disc were almost entirely empty. There was a sudden transition at the borders of the optic-nerve entrance between those sections of the blood-vessels which were almost devoid of blood and the remainder which were comparatively well filled. The optic disc was not swollen.

At the conclusion of the ophthalmoscopical examination the eyeball was found to have protruded to such an extent that the

lids could not be closed over it. A tight binocular bandage was applied. This was removed after the lapse of half an hour, when S was $= \frac{10}{200}$. The proptosis had diminished so that the eyeball could be completely covered by the lids. A hasty examination made with the ophthalmoscope showed that the arteries and veins of the disc were equally filled. The white discoloration of the retina was the same as before.

The compression bandage was reapplied, and only removed after the lapse of four hours. The inner portion of the visual field was then still found to be absent. Both arteries and veins were well filled, perhaps even more so than normal. The vicinity of the disc had recovered its natural red color, but the peripheric portions of the retina on the nasal side still showed white opacities, especially at the side of the blood-vessels. These opacities had, however, changed from large coherent patches to discrete dots.

This condition of the injured organ remained the same for the next half hour, at the expiration of which period the binocular bandage was reapplied and not disturbed until the next day. The condition noted then was as follows: The cornea was clear, the iris somewhat swollen, and the pupil smaller than the day before. The white patches situated in the outer peripheric part of the retina had become fewer, and could only be seen alongside the course of the vessels. During the next few days the eyeball receded into its socket, the chemosis diminished, and vision improved. On January 24th a slight diffuse opacity could be seen in the vitreous body. On January 25th two opaque streaks made their appearance in the cornea, converging toward its margin. The lens was perfectly clear. On January 29th the opaque streaks of the cornea had disappeared, the conjunctiva was pale, the size of the pupil was larger than normal, and it reacted sluggishly to light. The patches in the periphery of the retina had entirely disappeared, and only a few white dots were left.

February 2d, R E: $S = \frac{15}{100}$; Jæger, 15 with $+ \frac{1}{20}$. L E: $S = \frac{15}{40}$ with $- \frac{1}{10}$; Jæger, 1. Patient discharged from the ward and treated in the out-door department. February 7th, R E: $S = \frac{15}{10}$ with $+ \frac{1}{20}$; Jæger, 11 with $+ \frac{1}{15}$. A slight detachment of the retina was discovered on the inner side, the detached portion being occupied by a few white dots. March 1st, the detachment of the retina had increased. He could count fingers at eight feet with the right eye. The patient then discontinued his visits.

All the subjective and objective symptoms of this case could be easily explained by a retro-ocular hemorrhage, which, by its pressure, caused the disturbances of circulation in the eyeball, notably those of the optic nerve and retina. Whether the hemorrhage was occasioned by a fracture of the wall of the orbit or not, could not be made out. It was highly interesting to observe *how rapidly the retina became opaque after the blood-supply had been cut off, and how rapidly this opacity disappeared after the circulation had been re-established.* The normal pink color of the background of the eye was found to be restored four hours after a compression bandage had been applied. The diminution of the visual acuity was evidently *mainly* the effect of the interference with the circulation, although it would seem possible that the concussion of the eyeball may have contributed somewhat toward the loss of visual power. It could not be made out with certainty in this case whether the eyes had differed in refractive power before the accident or not. It is fair to presume that both eyes had been myopic, and that the myopic condition of the right eye had been changed by the hemorrhagic effusion to that of hypermetropia.

INJURY OF THE EYE BY LIGHTNING.

By Dr. HERMANN PAGENSTECHER, of Wiesbaden.

Translated by Dr. A. Schapringer, New York.

Five children, while at church, were struck by lightning and fell unconscious. On being carried out of the church they all recovered soon with the exception of E. K., a girl ten years old. She vomited while being carried to the village, which lay at some distance from the church, and recovered her senses only after the lapse of some time. Soon afterward her lids became considerably swollen. The following day she was seen by Dr. Schneider who has kindly furnished me with the following account of her condition at that time. She was unable to open her eyes. This was partly due to the great swelling of the lids, and partly to paralysis of the levator palpebræ superioris muscle. When the tumefaction of the lids had disappeared, the lids could not yet be opened, thus proving that the muscle was paretic, a symptom subsequently overcome by the application of veratria ointment. When the doctor first saw her the ocular conjunctiva of both eyes was congested, but the visual power was not affected. After the lapse of four weeks the condition of the child had improved so much that she was sent back to school, where the teacher soon discovered that her eyesight was not as good as it had been before.

It continued to deteriorate until May 14, 1879, when I examined her for the first time, with the following result: R E: Jæger 24, L E: S = $\frac{6}{60}$, Jæger 19. Both corneæ were clear. *Right* pupil irregular, slightly oblong, with the greater diameter in the vertical direction, considerably wider than the left. No synechiæ. Direct reaction to light feeble, associate contraction prompt, but only of short duration. After repeated instillations of atropine this pupil dilated in an upward direction. Later on eserine was employed, producing prompt and even contraction ad maximum.

Left pupil almost perfectly round, reacting well to the stimulus of light, but yielding only imperfectly to the influence of atropia. The reaction to eserine, however, was prompt. A dense, flat, and pretty well-defined opacity of considerable size and irregularly square shape occupied the posterior cortical substance of both lenses, that of the right lens being somewhat larger and denser. Each opacity was surrounded by a slightly turbid zone. The rest of the crystalline bodies were clear. The details of the background could not be made out. The visual field of either eye was normal. No traces could be found of any further injury by the stroke of lightning.

I saw the patient again on June 26th. With the right eye she could count fingers at three or four feet, with the left she could read Jæger No. 22. The opacity of the posterior cortex of both lenses had increased in size, and two white dots could be seen upon the anterior capsule of the right eye. One similar dot had formed in the other eye. The cortical substance in the vicinity of the dots was turbid.

July 31st.—The opacities of the lenses had progressed.

October 23d.—The white dots upon the inner surface of the anterior capsule had multiplied. With the right eye she could count fingers at the distance of one metre, with the left she counted them at two metres, and could make out single letters of Jæger No. 18. Atropia acted imperfectly.

On October 25th, discision of the right lens was performed, the opening in the capsule being made small. The operation was repeated on November 14th and on December 26th. The absorption of the lens substance proceeded slowly.

On December 10, 1880, the secondary cataract, including the posterior capsule, was operated upon by discision, in order to obtain a clear pupillary space. A functional examination made soon afterward showed that vision had not been improved. With $+\frac{1}{3\frac{1}{4}}$ she could count fingers at one metre only. The pupil being rather narrow and obstructed by remnants of the capsule, no satisfactory examination of the fundus could be made. White atrophy of the optic nerve could, however, be excluded with certainty. The patient was then discharged.

When I saw her again on January 10, 1883, I found both eyes free from irritation. The pupils were rather narrow, the left more so than the right. The direct reaction of the right pupil

to light was very slight, but the associated contraction was very prompt. The conditions were reversed in the other eye. The right iris was tremulous. The pupillary margin adhered in one spot to a remnant of the lens capsule, but the pupillary space was clear. The patient was able to distinguish movements of the hand through the whole extent of the visual field. With the left eye she could count fingers at eight feet, and the visual field of this eye was also normal. She distinguished colors well with either eye. She now said that she had been unconscious for two weeks after being struck by lightning, that she saw well at that time, and that it was only later on that her eyesight began to fail. Notwithstanding the fact that the pupillary space of the right eye was clear, the optic disc could not be seen distinctly, especially as the pupil could not be dilated by atropine. The disc appeared to be pale, veiled, and its edge blurred. The vessels seemed to be of normal size, but the arteries could not be distinguished from the veins. On the whole it was not exactly the picture which we see in white atrophy of the optic nerve. The opacity of the left lens had remained stationary and rendered ophthalmoscopic examination impossible. The girl is now a pupil of the Wiesbaden School for the Blind. She is physically well developed, but mentally very dull.

I waited with the publication of this case until I got an opportunity of ascertaining the condition of the optic nerve. A short time after the last examination of the patient, Professor Leber published an analogous case in *Graefe's Archiv* (Bd. xxviii., Abth. 3), adding a comprehensive list of all the published cases of a similar nature. My own case resembles that observed by Leber more than any other. The iris, the lens, and the optic nerve were mainly affected and had received permanent injuries. The dilating fibres of the iris were unevenly but almost totally paralyzed, while the sphincters were not affected. This was demonstrated by the eccentric position of the pupils, the inefficiency of atropine, and the prompt effect of eserine. It is remarkable that the physician who saw the child at the time of the accident, and examined her visual power, did not find it impaired, at least not to any noticeable degree. This is at variance with all the other observations that have been put

on record, but I have no reason to doubt the accuracy of the physician's statement. The impairment of sight found later on was due partly to the opacity of the lens, and partly to an affection of the optic nerve. This I determined already at the time of my first examination, from the fact that the opacity found in the posterior cortex of the lens was not marked enough to alone account for the great loss of sight, even taking into consideration that opacities situated in that part of the crystalline body interfere more effectually with sight than if situated in any other part. The cataract as well as the affection of the optic nerve developed very slowly. The ophthalmoscopic examination made five years after the catastrophe, though not quite satisfactory on the whole, pointed to neuritis which had run its course: a pale-red disc of woolly appearance with blurred outlines. White atrophy as well as primary atrophy of the optic nerve could be excluded with certainty. The field of vision and the perception of colors being normal, I was inclined to believe that the loss of vision was to a considerable extent to be accounted for by the opacity of the lens, and that the removal of this obstruction would result in the restoration of at least a part of the function of the organ. In this expectation, however, I was disappointed.

A CASE OF ABSCESS OF THE BRAIN WITH DOUBLE OPTIC NEURITIS, CARIES OF THE RIGHT ORBIT, AND ORBITAL CELLULITIS; WITH AUTOPSY.*

By GEO. S. NORTON, M.D.

THE relation existing between diseases of the brain and eye is one of so much interest to ophthalmologists, that all cases which tend to throw any light in this direction seem deserving of record. With this object in view the following case is presented.

William H., æt. twenty-two, was brought to my clinic, at New York Ophthalmic Hospital, from Rondout, N. Y., on April 27, 1880. The history of his condition, as clearly as could be obtained, was as follows: His health had always been good until two years ago, when he was struck on the head with an ice-hook. For two weeks he was confined to the house; a portion of the time in bed. From this he rallied, and seemed to be perfectly well until last summer, when he began to suffer with severe headaches, which were almost constant. About Jan. 1st he came home from his work with a severe "cold and fever," which continued three days, when the right eye became very red. On the fourth day, the right eye and corresponding side of the head were much swollen, and for one half hour had "cramps all over," with great difficulty in breathing. For nine days these spasms of the muscles were experienced daily, at 10 A. M. and 6 P. M., after which they ceased until eight weeks ago, when they again made their appearance and lasted for thirty-six hours. It was then found that he was blind in the right eye; that he could not

* Read before the N. Y. Medico-Chirurgical Society, Feb. 12, 1884.

speak ; and that the extremities were wholly or partially paralyzed. For four days he did not have a stool or pass his urine. During the past eight weeks he has had excessive thirst, especially at night, when he would drink eight quarts of water before morning. Three weeks ago the sight was lost in the left eye. On April 25th the convulsions returned.

Status præsens.—The patient lies helpless in bed ; only slight movements of either arms or legs being visible. The lower jaw is fallen so that the mouth remains open ; can only be closed by the action of the orbicularis oris, as the masseters seem to be totally paralyzed. He appears rational, and understands when spoken to, though it is with difficulty that he makes his wants known, owing to the loss of speech. No vision in the right eye, and only perception of shadows in the left. Examination of the right eye shows much swelling of the lids, some chemosis and prominence of the eyeball, and other symptoms of orbital cellulitis, together with suppuration of the whole cornea. At the edge of the orbit, near the outer canthus, is a fistula discharging pus. The right side of the head is also much swollen and hard, as we see it in periostitis. In the left eye no abnormal indications are manifest externally, with the exception of a dilated pupil. The refractive media are clear. The ophthalmoscope, however, reveals all the characteristic appearances of engorged papilla.

On the evening of April 28th, twitching of the muscles of the extremities was noticed, and the patient complained of severe headache. The next day the spasmodic action had ceased, though the pain in eyes and head continued ; the urine was passed involuntarily ; the appetite was better, and the thirst less. Various remedies were administered, but with only temporary relief of individual symptoms. No marked change in his condition was observed from this time to May 3d, when he became comatose, and died at 4 P.M.

Autopsy, twenty-two hours after death.—The post-mortem examination was made by Dr. F. E. Doughty, assisted by Dr. Chas. Deady, with the following results: The right temporal muscle was much swollen and œdematous. After removal of the skull-cap the surface of the brain (meninges) was found somewhat hyperæmic. The brain was now removed in its membranes. Inspection of the floor of the skull revealed a caries of the orbital plate of the frontal

bone corresponding to the apex of the lesser wing of the sphenoid on the right side, causing a direct opening into the right orbital cavity. For some extent around, the bone was roughened. Upon opening the membranes at the base of the brain a large mass rolled out, dropping upon the floor. It was the shape of a kidney and nearly as large, being three inches in length, one and a half inches in width, and one inch in thickness. It proved to be a large sac of pus. The cyst wall was about two millimetres in thickness and very strong and tough. On making an incision through it, about one and a half ounces of thick, green, unoffensive pus escaped. Further examination showed that the right middle cerebral lobe had been wholly occupied by this tumor; no convolutions or indications of brain matter remaining. The anterior lobe of the cerebrum in the vicinity of the fissura Sylvii was somewhat softened, as was also, to a limited extent, the brain substance in connection with the tumor posteriorly. The fluid in the subarachnoid space as well as in the ventricles was a little more than normal.

Remarks.—A few points in this case are peculiar and seem worthy of special mention. The cause of the abscess in the brain is without doubt correctly assigned to the injury of the head two years previous to death, and about one year before the severe headaches were experienced. This interval between the injury and first appearance of cerebral symptoms is unusually long, though one case is recorded by Dr. Gull [1] in which distinct symptoms of the cerebral disease did not appear until one year after "a fall on the pavement." The relation existing between the disease in the brain and in the orbit is also of much interest in this case of mine. The orbital cellulitis was in all probability dependent upon the carious condition of the orbital walls and was therefore secondary to the disease of the bone and brain. Which of the two latter was primary is a question not easy of solution. The abscess in the brain was well encysted and although in connection with the carious bone, no communication existed between the bone and sac, and no adhesions of the cyst with surrounding structures could be found. Dr. Gull also reports a case in which an abscess of

[1] Reynolds' "System of Medicine," vol. 2, p. 590.

the brain was associated with an orbital lesion ; but in his case the abscess was not encysted, was caused by extension from an abscess in the orbit, and was in direct communication with the same. This complication of abscess of the orbit extending to the brain is nothing new, as the fact has long been recognized by ophthalmic surgeons, but to find the orbit secondarily involved is by no means common. The co-existence of optic neuritis is nothing remarkable, as it is usually present in cerebral diseases which produce increase of the intracranial tension, as tumors, abscesses, etc.

ECZEMA SIMPLEX—AMETROPIA ITS CAUSE.*

By S. O. RICHEY, M.D., Washington, D. C.

SLIGHT degrees of ametropia are often followed by consequences seemingly incommensurate with the cause. The reflexes of ametropia are frequent, annoying, and often peculiar. Neither the experience nor the reading of the writer have before brought to his attention a case such as that herewith described, and he can find in medical literature no case of eczema attributed to the same source.

Oct. 14, 1882.—C. K., a girl æt. ten, of robust appearance, and enjoying good general health, but suffering with supra-orbital pain after any attempt at using her eyes, was examined by me. At a period, varying from two to ten hours after taxing the eyes, the upper and lower lids of the right eye especially, became œdematous. The swelling extended over the malar prominences to the alæ nasi, and was accompanied by an erythema of the malar prominences, followed by a vesicular eruption, during which the parts affected were sensitive to the touch. The time necessary to read at twenty feet distance the ordinary Snellen's test-type was sufficient for this effect.

The eyes were normal, except for a hypermetropia and a resultant amblyopia, O. D. V= $\frac{20}{40}$: O. S. V = $\frac{20}{30}$–. With mydriasis ; O. D. V = $\frac{20}{40}$: O. S. V = $\frac{20}{100}$. With both eyes V = $\frac{20}{30}$–. With + 1.25, O. D. V = $\frac{20}{30}$+. With + 1, O. S. V = $\frac{20}{30}$+. With the lenses and both eyes, V = $\frac{20}{20}$–.

Nov. 15*th.*—The lenses have been worn constantly. Eserinæ sulph. and the galvanic current have been applied topically, with the result that the two sides of the face are alike in size, and ten

* This case was referred to me by Dr. C. E. Hagner, with the impression that the eczema depended on probable ametropia.—S. O. R.

minutes' reading causes nothing more than a blush upon the right cheek, which lasts only a few hours. This effect of the use of the eyes is gradually diminishing, and the patient does not complain of any pain whatever.

Nov. 15, 1883.—There has been no return of the eczema, although the child is using her eyes—with the glasses—beyond the usual school hours, probably seven or eight hours daily.

We find infrequently this condition of swelling, extending, from the eyelids down upon the cheeks when there is ametropia, and particularly in cases of mixed astigmatism; but extravasation of blood is rare, and it has not before been my fortune to observe the eruption which in this case has followed any attempt at use of the eyes. The eczema is an expression of disturbed vaso-motor action, by reflex influence through the cavernous plexus of the sympathetic, which gives off filaments to the third cranial nerve just before it divides posterior to the sphenoidal fissure. As the third nerve supplies motor power to the ciliary muscle, the connection is very direct.

A CASE OF BI-TEMPORAL HÆMIANOPIA.

By H. F. HANSELL, A.M., M.D., Philadelphia.

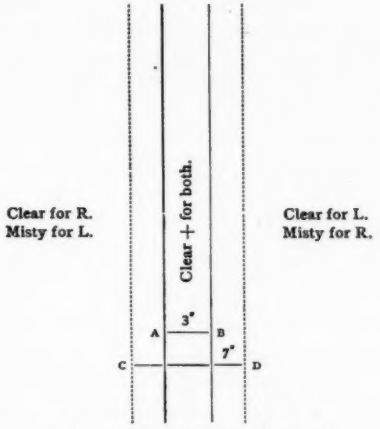
Mr. Henry, æt. fifty-four, engraver, came under observation July 11, 1883, complaining of diminishing vision during the past three months. At times he had suffered from pain in the forehead—neuralgia, he called it,—which, however, was independent of the use of the eyes. In addition to this frontal pain, he has a nearly constant dull ache in the posterior part of eyeballs, also unaffected by use of the eyes. Color-perception was not at first tested, but later it was ascertained that for several months before coming under observation, and for a short time after, he was red-blind. Being an intelligent man, and accustomed to close observation by the nature of his business, his statement may be accepted as reliable. After his vision had been partly restored, the color-sense was tested by means of Holmgren's colored worsteds and found perfect. His principal complaint was his failing vision; the pain was an annoyance merely, never the cause of suffering. This failing vision he noticed both for distance and near. The signs in the street, which he had formerly distinctly read, were now almost invisible. The morning paper, which he had read at the breakfast-table for many years, he now passed over to his wife that she might read him the news. I could obtain no history of syphilis, or of injury on the head, except a slight blow received three years before, which was not severe enough to cause insensibility or to give him any trouble. His health was apparently perfect, notwithstanding that he had indulged, for thirty years, in an average of six drinks of spirits and six cigars daily; urine normal.

Examination.

Right eye: External appearance normal; V = $\frac{10}{100}$, not improved by any glass; media clear; *fundus normal.* The only

pathological symptom, besides the deficient vision, was in the visual field, and this the patient had noticed himself. With the right eye open, and the left closed, all objects to the *right* of the median line were indistinct, while those to the left were clear—not as clear as to a normal eye, because the central vision was so much below normal, yet free from the cloud or mist which enshrouded objects to the right.

LEFT EYE: External appearance normal; media clear; *fundus normal.* V = $\frac{10}{200}$. With the left eye open, and the right closed, all objects to the *left* of the median line were misty and indistinct, while those to the right were clear.



Distance of eye from board — 12″.
" from A to B — 3″.
" " C to D — 7″.

As will be seen by inspection of the diagram of the visual field, the line of division between the clear and the misty did not pass exactly through the median line, but in the right eye was slightly to the left, and, in the left eye, was slightly to the right. For each eye *it was exactly vertical* and sharply defined, so that there was a common field for both eyes, a narrow vertical strip with the point of fixation in its centre (bounded by continued vertical lines nearest the point of fixation). This defect in the field, and the sharp vertical line of separation, were well illustrated in testing the vision.

The card used was published by Borsch, after Snellen's

test-types, and contained the letters E (200), T, B (100), D, L, N (70), etc. At eight feet Mr. Henry could read, with right eye: E, T, D; the last two misty—*i. e.*, letters on left-hand side of card; the B of the second line could not be distinguished. With the left eye he could see E B; the T of the second line was indistinguishable.

Treatment.—For the first month, the battery was applied twice weekly, but afterward, believing the benefit was due to medicine and not electricity, the latter was discontinued. He was ordered strych. sulph., gr. $\frac{1}{32}$ t. d., and potass. iodide gr. x. t. d., to be taken separately. This treatment was continued, with slight interruptions and modifications, for the following six months. At times the potass. iod. was discontinued, and bicl. of mercury substituted, or both stopped and a tonic pill ordered. The strychnia he has taken regularly, and the credit of the result should be attributed to that remedy.

The vision commenced to improve as soon as the patient was put under treatment. The improvement was gradual and slow. At no time was there any marked advance, and there never was any retrograding—vision once obtained remained. Without following each change, I pass to the last record of the vision taken Feb. 1, '84.: R. E. $\frac{20}{30}$, L. E. $\frac{20}{30}$, all but one letter. With both eyes together $\frac{20}{30}$ full, and a part of $\frac{20}{20}$. In testing V, it was always found that when both eyes were open, it was decidedly better. In reading the letters of the 40 and 30 lines with only one eye, Mr. H. could always distinguish them easier by beginning at the *right*-hand end of the line—a peculiarity before noticed in testing V in cases where the optic nerves were partly atrophied. With the improvement in the V the mistiness gradually diminished, and the clear vertical strips, common to both eyes, became widened, as is indicated by the uninterrupted line in the diagram. The cloudiness, however, has not entirely cleared up. The temporal half, as seen by each eye, is still enveloped in a slight fog, though very much less dense than six months ago.

The following **Remarks** are based upon Mauthner's "Gehirn und Auge," where the subject of hæmianopia in its different varieties is exhaustively treated. He has collected twenty-three reported cases of crossed temporal hæmianopia, and, after a short separate description of each,

considers them collectively, and formulates the symptomatology and cause of the disease. The defect shows itself in one of two ways: either a small scotoma develops immediately at the lateral side of the vertical line, through the fixation-point, which gradually spreads until the entire lateral half is involved, or the hæmianopia is preceded by entire blindness, and only when perception of light returns is the defect noticed. Both eyes may be affected simultaneously, or first one and then the other: The defect is not always the same in each. It may be the entire lateral half in one, and only a section of the lateral half in the other; or one be advanced to total blindness, while, in the other, the defect is well marked. The central vision is always below the normal; the greatest vision retained in the cases compiled by Mauthner was $\frac{2}{3}$. In ten of his cases the line of divisions between the nasal and temporal fields was vertical and sharply defined; in eight, it was either vertical and through the fixation-point, or nearly vertical and through the fixation-point, or vertical and near the fixation-point; in two, there was a zone of partial vision between the sensitive and insensitive fields. The ophthalmoscopic examination was negative in five; simple atrophy of the nerves in two; beginning atrophy in one; atrophy after neuritis in one. Complications were numerous in some, and others were entirely free. Cases have been observed for fourteen years during which not a single brain symptom or paralysis was developed. Again, hæmianopia is associated with loss of smell and taste; paralysis of an eye-muscle; polyuria; loss of memory, of speech, of intellection; with vomiting, anæsthesia, hyperæsthesia, etc.; and, finally, a fatal termination. One of the twenty-three cases resulted in a perfect cure, and one in a permanent improvement.

Site of lesion.—In crossed temporal hæmianopia this must be in one of three places: in the anterior angle, the posterior angle, or in the middle of the chiasm, between the two, and in a typical case it must involve all three; in other words, every crossed fibre must be affected. If in the anterior or posterior angle, the pressure must be exerted *only* on the crossed fibres. If a tumor develops in the angle or in the

centre and spreads, it must stop exactly where the uncrossed border on the crossed fibres, and must compress the latter entirely, and the former not at all. Such a supposition is just as impossible as that of a pressure on either lateral angle, advocated by believers in the theory of total decussation, to explain homonymous hæmianopia. Mauthner asserts, that the explanation of the sharp dividing line in temporal hæmianopia is a simple one, according to the plan of partial crossing. The pressure is exerted on the chiasm in a sagittal direction, from the anterior to the posterior angle—a pressure which may spread laterally to some extent, but must not overstep a certain limit. An exostosis, for instance, might be of such a size as to press upon all the crossed fibres, and by its sharp boundary line not compromise in the least the lateral, and thus produce a complete bi-temporal hæmianopia, which might remain unchanged for many years. A circumscribed periostitis, in a similar situation, would be a possible cause. A new formation of any kind, so long as it is limited to the centre of the chiasm, would cause the same symptoms. As soon as the disease spread beyond the limit of the crossed fibres and involved the lateral, the sharp boundary line is lost, and when all the lateral fibres are pressed upon, no part of the retina is perceptive. It may spread to either side, causing the loss of one eye, while in the other the vertical line remains sharply defined.

The chief points of interest in Mr. Henry's case are: 1 The *partial* anæsthesia of the nasal half of the retina; 2, the vertical line of division, close to but not including the fixation point, and the gradual lateral movement of that line; 3, the absence of all complications; and 4, the recovery.

A CASE OF EXOPHTHALMUS, AFFECTING BOTH EYES, WITHOUT PULSATION—EPISCLERITIS —SPONTANEOUS RECOVERY.

By Dr. CORNELIUS WILLIAMS, of St. Paul, Minn.

FORMERLY ASSISTANT SURGEON AT THE NEW YORK OPHTHALMIC AND AURAL INSTITUTE, ETC.

Mrs. J. S. Davis, aged about fifty, of moderate height, blonde, general health fair, was sent to me on July 10, 1883, by Dr. Park Ritchey, of this city. She says that some years ago she had a protrusion of one eye which remained for some time, and finally disappeared. About two months ago, upon awaking one morning, she found that the right eye protruded, and within a few days the left one became prominent also. Present condition: Both eyes are very prominent, the right more than the left. The lids are a little reddened, conjunctivæ red, no unusual secretion, no chemosis; episcleral tissue of both eyes is seen to be thickened uniformly all around the globe of either eye, more pronounced in the right. There are some old opacities of the corneæ, with opacities of the vitreous right; sclero-choroiditis; both lenses normal. Tn. fc.; reads ordinary type; M = $\frac{1}{4}$. A careful stethoscopic examination of the eyes failed to detect any abnormal bruit, nor was there at any time any sign of pulsation. I advised no special local treatment; to come again in a few days.

July 26th.—The protrusion is very marked, still greatest in the right. There is very slight mobility and faulty projection, especially when looking down in daytime; by lamplight she sees as well as ever. She is not conscious of any diplopia. At this visit and at the previous one I made a careful examination as to any growth or other abnormal condition in any of the neighboring pneumatic cavities, as also did Dr. Ritchey and Dr. A. J. Stone, with a negative result; heart normal. The patient has

used iodide of potassium in ten-grain doses, at my suggestion, also electricity to the eyes, at the suggestion of her physician, with no result.

Aug. 11th.—The conditions are the same ; some epiphora due to the protrusion. The optic discs are perhaps redder than normal.

Aug. 30th.—The exophthalmus is yet greater than before ; there is a sensation of fulness which persists for some time after stooping, protrusion estimated at fully 6 *mm.;* advised to take the iodide in gradually increasing doses until they had reached thirty grains, three times a day.

I heard from the patient occasionally that she had continued the medicine for some time without any change in her condition, and had then discontinued it.

Nov. 13, '83.—The eyes are quite normal in appearance, no redness or swelling of the tissues ; they have been so for several days ; the protrusion with other symptoms had gradually subsided.

In this case it is difficult to account for the exophthalmus on any hypothesis usually advanced to explain such protrusions. There had been no injury ; and to suppose that there was any inflammatory condition in any of the intracranial venous sinuses interfering with the return of blood through the ophthalmic vein would not be warranted by the history or the result. If there had been any collection of fluid or growth in the frontal or ethmoidal sinuses, or in the antrum of Highmore, the presence of such condition would have been made manifest by other signs, but none were at any time perceptible. The possibility of Graves' disease was suggested by one of the gentlemen who saw her, but her heart was normal and there were no symptoms pointing to goitre. Dropsy of the capsule of Tenon there was not, since there was no chemosis or pain on pressure.

I think the condition was due to a backward extension of the inflammation of the subconjunctival tissue, involving the whole mass of connective tissue within the orbit, producing swelling and œdema of the same, and thus pushing the eyeball outward. I apprehended that the same causes which produce episcleritis in such persons ordinarily, were in operation here,—probably some condition of the blood

akin to that which gives rise to rheumatic inflammations in other parts of the body.

This was the opinion which I gave to the medical attendants at the time, and the treatment was based upon that hypothesis. It should be stated that though this lady is highly myopic, there is no protrusion of the eyes normally.

CASE OF SPARKLING SYNCHYSIS, KERATO-IRITIS, AND POISONING BY SULPHATE OF DUBOISIA.

By F. M. WILSON, M.D., Bridgeport, Ct.

Mr. S. T., age seventy-four, retired business man.

Oct. 7, 1883.—Eye (left) first sore on 5th; three small punctate spots in infero-nasal quadrant of cornea. Also showers of crystals in his vitreous, most of which settle out of sight when his eye is still, a few do not. He claims to have had these floating spots before his left eye for twenty years or more, and that up to the 5th the left eye had equal vision with the right. No crystals in R. E. Slight ciliary injection. Atrop., gr. iv. ad ℥ i.; instill one drop every three hours. Hot-water fomentations every hour.

Oct. 14*th.*—Atropine and hot water have been continued. The keratitis, which at first was in punctate spots, without any loss of tissue, has developed into a linear ulcer extending tortuously from infero-nasal to supra-temporal quadrant. There is considerable watery œdema of conjunctiva, also some œdema around the orbit. He complains much of pain after each instillation of atropine.

Oct. 16*th.*—Pus in the anterior chamber. Up to date his general condition has been good. His heart intermits one beat about every twelfth. To-day he complains of hands trembling, and of feeling weak. Strych. sulph., gr $\frac{1}{60}$ t. i. d., and change from atrop., grs. iv. ad ℥ i. to eserine, grs. ii. ad ℥ i.

Oct. 17*th.*—Says the eserine "hurts him" worse than the atropine. Has been hammering me about a poultice. The pus has increased in the anterior chamber. He finally decides to have a poultice on anyway, and I withdraw from the case.

Oct. 18*th.*—They send in haste saying "he is much worse." I find the anterior chamber now about one third full of pus; the pupil contracted by the eserine. The cornea has the soaked look

which follows poulticing. Within half an hour I drop in seven drops duboisiæ sulph., grs. iv. ad ʒ i. Two hours after, word is brought that he is "out of his head." I find him with excessively dry throat—so dry that he can hardly talk; pupil of R. E., into which no drops had been instilled, slightly dilated; face flushed; mildly delirious—*i. e.*, I could fully rouse him, and he was rational enough, but if left to himself rambled incoherently from one subject to another; exaggerated power of contracting his muscles, but marked lack of co-ordination—*i. e.*, in attempting to restrain him he seemed transformed from a feeble old man into a vigorous one, but could not co-ordinate his muscles so as to stand alone; pulse full and strong, but irregularly intermittent; some disposition to sleep but only in short naps. I remained with him two hours, and finding that the symptoms abated rather than increased, did nothing. Six hours later the symptoms had nearly disappeared, the mental confusion being last to go. Within ten hours after the instillation of the duboisia, the pus in the anterior chamber, which, up to this time, had been steadily increasing, began to diminish.

He is to have quiniæ sulph., gr. ii., and strychnia, gr. $\frac{1}{60}$, t. i. d., continned, and small doses of brandy. The duboisiæ sulph., gr. iv. ad ʒ i., is to be instilled also t. i. d.

Oct. 20th.—Pus has disappeared from the anterior chamber. The ulcer is healing. Duboisia has been continued t. i. d.

Oct. 24th.—Gradual amelioration of all the symptoms. The pupil, for the first time since the appearance of pus, is now fully dilated.

Nov. 1st.—Recovery with irregular scar extending nearly across the cornea. Vision not tested.

From the patient's statements I am inclined to believe that he has had the crystals in his vitreous for many years, with little, if any, impairment of his vision. One factor in causing his keratitis may be found in the fact that, owing to some theories which he held about food, his allowance to himself was far from liberal, and it was only after much persuasion that I induced him to take a liberal quantity of meat, eggs, etc. I have rarely, if ever, seen a case where both atropia and eserine caused so much irritation. The duboisiæ sulph. caused no irritation whatever. My overzeal to get his pupil dilated and prevent synechiæ,

is apparent. It should be noted that we have the natural history of a mild case of poisoning, as nothing was done to modify the symptoms; also that the pus in the anterior chamber increased up to the time of the instillation of the duboisia, and began to decrease soon after. The final result of recovery without perforation of cornea, and without synechiæ, is better than I expected.

A GLIOMA OF THE RIGHT EYE SPREADING BY METASTASIS THROUGH MANY PERIOSTEAL CENTRES.

By JULIAN J. CHISOLM, M.D., of Baltimore, Md.

(*With an engraving.*)

CANCERS originating in and about the eye are unfortunately of frequent occurrence, and, therefore, are no longer reported. Now and then a case presents itself which deviates so far from the regular course which all such cases follow toward the fatal issue, as to be worthy of note. In this class is the case now reported,—one in which a glioma, originating in the right retina of a young child, is followed by successive outgrowths from centres of metastatic infection; periosteal nodes developing with great rapidity over the parietal, mastoid, lower maxillary, and clavicular regions, on opposite sides of the body to the eye in which the cancer first made its appearance. Hideous deformities are produced by these rapidly developing tumors, before death relieves the little patient.

W. J., a bright mulatto boy, two and a half years of age, was brought to me for a defect in the right eye. He was of delicate frame, but had never been seriously sick. The ever-watchful mother had conceived the idea that vision in the right eye was defective, and that the pupil had exhibited a glassy look, which was not natural to the child. To all appearances the eye was normal, except that the pupil was somewhat dilated, as if under the partial effects of a weak atropine solution. It did not contract under the influence of light. There was neither injection, discolor-

ation, nor weeping of this eye. Ophthalmoscopic examination showed a whitish yellow reflex in the fundus, which induced me to note the case as a suspicious one. As there were no symptoms calling for active treatment, the mother was instructed to bring the child back for further examination. I was soon convinced, after a very few visits, that I had the usual form of intra-ocular growth of childhood to deal with. As the eye was causing no trouble whatever, and the mother was expecting the eye to be restored, I did not urge immediate enucleation, especially as she was not prepared to make such a sacrifice. I explained to her the nature of the trouble, and concluded to await some expression of irritation in the eye, or evidence of suffering on the part of the child, before discussing with the mother the propriety of removing the eyeball.

Four months passed without the eye undergoing any visible change, the intra-ocular growth seemingly being in an undeveloping state. There was neither scleral injection, nor any other external vascular disturbance. The iris had undergone no discoloration; the pupil remained partially dilated, but was not yet exhibiting the whitish reflex from the glioma except under oblique illumination. The eyeball was not displaced, nor were its move-

ments in the socket in any way hampered. This led me to believe that the small growth, which had not yet occupied the vitreous chamber, had not grown in the direction of the socket, nor involved the optic nerve.

The child had recently suffered much from the summer's heat, and was much enfeebled from cholera infantum. I advised its removal into the neighboring county, so as to escape the confinement of the city; also that the child be brought in should any change occur.

At the end of a month I again saw the child, and recognized at once a slight prominence of the eyeball, with displacement downward and inward. There was also a fulness on the temporal side of the eyebrow, which was continuous with the socket. This recent swelling seemed adherent to the orbital rim and felt, as if it were a thickening of periosteum. The eyeball itself had undergone no change in appearance, and, while the slight strabismus was evident, the movements of the eye were not materially restrained. At this visit the mother called my attention to two small knots under the hair of the scalp: one, the most conspicuous, was over the left parietal protuberance; the other, over the apex of the occipital bone. They were periosteal nodes, flattened, although well circumscribed mounds, the skin gliding freely over them. When handled, the child gave no evidence of pain. The mother was quite sure that they had appeared within the last week. The brow-thickening convinced me that enucleation now would be a useless operation, and, therefore, the course of the disease was to be simply one for clinical observation.

In two weeks the child was again seen. The displacement of the eye was much more marked by the development of the socket and brow-swellings, which had extended also externally to the temple. A third knot had made its appearance near the right frontal suture, two and a half inches above the orbital swelling. The growth over the left parietal bone had decidedly increased. The child's appetite was poor; he had spent restless nights, and had evidently lost flesh since the last visit. I prescribed a ferrated tonic, and recommended the use of anodynes, gr. ii. of sulphate of morphia to aqua ℥ viij., a teaspoonful at bedtime.

In two weeks the child was again seen. There was a general increase in all the head lumps,—especially of the socket and temple-growth, with marked prominence of the still unchanged eyeball. The original tumor of the right socket, and that over the

frontal suture, were rapidly approaching each other. At this visit my attention was called to other small knots under the scalp, and especially to a broad, well-defined node on the outer face of the left inferior maxillary bone in front of the ramus. It resembled in every respect the previous developments, and was strictly periosteal. The flat lump was confined to the outer face of the bone, the skin being perfectly free over it. Since its discovery—even in a few days—it appeared to have exhibited excessive energy. The child's appetite had improved under the tonic, but his restlessness at night demanded several doses of the morphia solution to quiet him. The strength of the morphia was increased to gr. iii. to ℥ viii. of water, a teaspoonful when necessary. The hot weather was now over, and the child had been brought back to the city, so that I could see him more frequently.

As he was brought for inspection from week to week the development of the various growths was quite perceptible from visit to visit. The eyeball, not yet increased in size, had been pushed quite out of the socket. The tension effect of rapid protrusion had caused the cornea to yield, and a yellowish crust covered its surface. The jaw swelling had grown more rapidly than any other of the tumors. The left half of the inferior maxillary bone had increased generally in size, in length as well as circumference, so as to thrust the chin to the right side of the body. It appeared to have undergone a general infiltration from the malignant cell growth. The teeth were displaced in an irregular line but none of them were very loose. The skin, over all the largest swellings, had lost its normal yellow color, and from an admixture of red from the very vascular character of the subcutaneous growth had assumed a bronzed tint, with glistening appearance from the tension. Large dark vessels marbled the polished surface of both the jaw and temple swellings. Both of these tumors were so soft and elastic as to give, to a marked degree, the deceptive fluctuation of encephaloid cancer. An additional nodule had made its appearance over the left brow. It was separated for a considerable distance from the right brow tumor, which had spread rather toward the temple than encroached upon the median line. In spite of the large size of the socket growth the root of the nose was still sharply defined. At this time my attention was also called to a well-outlined swelling over the left clavicle, clearly a periosteal circumscribed thickening over the centre of the bone. With the growth of the tumors the body had steadily undergone emaciation.

This was the last visit of the child to my office. Besides its feeble condition, it had become too conspicuous an object to be carried through the streets. The head, of huge size, had become so weighty in its deformity that it could no longer be supported by the straw-like neck. The appetite was good, but the body was steadily dwindling away. The child was now taking a grain of morphia a day, and even this large quantity for a child three years of age did not furnish it with its quota of sleep. Mentally the child was very bright, much beyond the average, and continued so to the end, showing that at no time was there any cerebral complications.

Marasmus and final exhaustion brought the child relief on Nov. 5, 1883, twelve months from the date of the first examination, and six months from the first evidences of metastatic developments. At no time had there been any breaking of the skin over any of the tumors, nor had there been any bleeding from the eye growth. At the time of death the child's head must have weighed much more than the rest of the body. It was the head of a monster, attached to the skin-covered skeleton of a three-year-old child. The arms at the shoulder were not one inch in diameter and the thighs were only a trifle larger. An autopsy was not permitted, but there were no abdominal lumps to indicate developments in the viscera.

The striking peculiarity in this case was the metastatic growth, always periosteal, from the primary eye trouble. Once starting they so completely eclipsed the original trouble that the eye growth seemed to have come to a standstill. Long before the vitreous chamber became full of the primary growth, the secondary head tumors had attained a size coequal with the head itself. There seemed to have been no visceral complications, only periosteal invasion of the superficial bones of the head and finally of the clavicle.

A case of metastatic glioma, strikingly similar to the one just described, is reported by Dr. H. Knapp and C. S. Turnbull in the ARCHIVES OF OPHTHALMOLOGY, for 1874, vol. iv, No. 1. In this case he was fortunate enough to have secured the specimen for autopsy and microscopic examination. He found no abdominal nor thoracic complications. In his case periosteal outgrowths were developed on various

parts of the head including also the lower jaw. In all the tumors the well-known microscopic appearances of glioma or encephaloid cancer were found, showing a common character to both the eye and head tumors, and fixing the metastatic nature of the glioma. Such frightful cases occur, fortunately, very seldom, and only five or six of a similar nature are on record. The first is described by Dr. H. Knapp in his "Intraocular Tumors," 1868 (Wm. Wood & Co.), with full details and numerous drawings of the ophthalmoscopic appearance, and the ante-mortem and post-mortem, macroscopic and microscopic conditions of this disease.

EPIPHORA FROM CONGENITAL ATRESIA OF THE PUNCTA LACRYMALIA—SUCCESSFUL OPERATION FOR ITS RELIEF.

By SWAN M. BURNETT, M.D., Washington, D. C.

OPHTHALMIC AND AURAL SURGEON TO THE GARFIELD MEMORIAL HOSPITAL, AND TO THE CENTRAL DISPENSARY AND EMERGENCY HOSPITAL.

UNTIL the occurrence of the following case in my own practice caused me to examine somewhat into the literature of the subject, I had an idea that congenital absence or atresia of the puncta lacrymalia was not a very rare anomaly.

I find, however, that it is passed over in silence by the majority of treatises I have been able to consult, and only three cases are on record in the periodicals devoted to ophthalmology.

The history of my own case is as follows:

H. L. C., ten years of age, is reported by his parents to have had a "watery eye" since his earliest infancy. He has never had any inflammatory trouble or traumatic injury to either eye. On examination I found a constant epiphora of the left eye, and searching for a cause found the lids in place with no signs of past or present inflammation. The papilla of the punctum was not at all pronounced on either lid, being manifest simply as a very slight elevation of the inner margin of the lid. There was no punctum, but occupying the position the punctum usually does was a dimly defined whitish-yellow ring surrounding a darker centre which was very slightly depressed. A most careful examination by means of the oblique light and a strongly magnifying lens failed to detect even the smallest opening. The whole space was covered by smooth, shining epithelium, and the smallest probe glided over the

surface without penetrating. The condition of the upper and lower lids of the left eye and the lower lid of the right eye was substantially the same. The punctum of the right upper lid was small but permeable. There was no watering of the right eye. I examined the lid of a sister who came with him, and found her puncta small, but pervious.

At that time I had not read the account of Zehender's case reported below, and not knowing to what depth the atresia might extend, I thought it wiser to search for the canaliculus than to attempt to open the punctum. I therefore made an incision with the scissors about 2 *mm.* inward from the ordinary position of the punctum on the lower lid, at right angles to the course of the canaliculus. I then searched by means of a No. 2 Bowman's probe for the canaliculus, and had no difficulty in finding it, and pushing the probe to the nasal wall of the sac. I then introduced the canaliculus knife, and opened the canaliculus for the distance of about 2 *mm.* Two days afterward he returned, completely relieved of his "watery eye." I found the opening I had made in the canaliculus nicely hugging the ball, and as the relief was perfect and the patient unruly, I did not deem it necessary to operate on the other lid.

The only references to congenital absence of the punctum I have been able to find have been by Fick,[1] v. Walther,[2] and Desmarres.[3]

Fick only says: "that Morgagni relates an instance of congenital absence of the puncta, but this is exceedingly rare." V. Walther says: "Atresia of the puncta and the beginning of the canals, aside from monopsia and micropsia, is not to be met with as a congenital defect."

Desmarres has more to say about it than is to be found in any systematic treatise I have examined. He says: "It appears, according to many authors, that this anomaly of conformation is far from being rare. Seiler, Shoen, C. Labus, Carron, and many others have noted it, but for the most

[1] "A Treatise on the Diseases of the Eye," by George Fick. New edition, with notes by R. Wilbank. Lond., 1826. P. 268.

[2] "Lehre von d. Augenkrankheiten," by Ph. Fr. v. Walther. Freyberg, 1849. 2 B., p. 205.

[3] "Traité théorique et pratique des maladies des yeux." Paris, 1854. T. 1, pp. 280, 281.

part with a concomitant absence of the eye. I have seen a goodly number of patients affected with lachrymation, in whom the lachrymal canaliculi were wanting, and where there was no evidence of inflammation, but all had had in their infancy trouble with their eyes, which had continued for some time. Are these absences of the canaliculi congenital, or were they closed during the progress of the infantile inflammation? I cannot say. Be that, however, as it may, I would only call these absences congenital when they are seen in the newly born (though I am far from denying that it might be otherwise)."

Mooren,[1] in his statistics of 108,416 patients, gives only a single instance of defectus punctorum lacrymalium. Schirmer, in his treatise on the diseases of the lachrymal apparatus, in *Graefe und Saemisch's Handbuch*, dismisses the subject with a line which refers to Zehender's case given below.

A more extensive research into the literature might bring to light some other cases, but it is evidently an anomaly of very unusual occurrence.

The first case observed and described with any detail or accuracy is that of Zehender.[2] It was in the person of a girl of twelve years, who had lachrymation of right eye since infancy. Examination showed an absence of both puncta in R. and of the lower punctum in L. The papillæ were very slightly marked, but there was a whitish ring with a darker depression in its centre which was covered with epithelium. The most careful examination by means of the magnifying glass failed to discover any opening. This dark spot was punctured with a discision needle, and it was found to enter the canaliculus, and water injected into it passed to the sac. The patient was relieved of her troublesome lachrymation.[3]

The other two cases are from the practice of Dr. Hugo Magnus, of Breslau. The first was reported in *Zehender's*

[1] "Fünf Lustra oph. Wirksamkeit," 1882.

[2] *Zehender's Monatsbl. f. Augenheilk.*, B. v., 1867, p. 131.

[3] While reading the proof of this paper, *Zehender's Monatsbl.*, for January, '84, has come to hand containing an account of a second case seen by Zehender very similar to his first.

Monatsbl., B. xiii., p. 176. In this both the lower puncta were absent, and there was no trace of papillæ. In the second case, (*Hirschberg's Centralbl.*, April, 1880,) there was dacryocystitis of the R. eye in a girl of twenty-one years, and both lower puncta were absent. The edges of the lid were perfectly smooth, with no signs of papillæ. The upper canaliculus of the R. eye was slit, and the inflammation of the sac treated. Two attempts were made to find a punctum or canaliculus by making incisions at the place where they should be found, but without avail.

All inquiries as to the cause of these congenital absences of the punctum, whether simply from over-skinning by epithelium, or from a real lack of the papillæ, are, of course, mere matters of speculation. Desmarres raises the doubt as to whether they are to be considered as congenital when seen beyond the period of early infancy, looking upon them as due to adhesive inflammation. As a matter of fact, we know that adhesions about the punctum and canal are very rarely indeed the results of even long-continued inflammatory processes, affecting the palpebral margin, and we have little difficulty in keeping open incisions which we make for therapeutical purposes.

In view of this fact, I should look upon all atresiæ or absences of the puncta, when unaccompanied by evidences of very severe palpebral inflammation, as of prenatal origin.

BORO-GLYCERIDE IN THE TREATMENT OF CONJUNCTIVITIS TRACHOMATOSA (ARLT); OPHTHALMIA CONTAGIOSA OF ASYLUMS.

By CHAS. S. TURNBULL, M.D., Philadelphia.

Ophthalmic and Aural Surgeon to the German Hospital, etc.

SIX months ago my attention was first called to the fifty-per-cent. solution of boro-glyceride, and the ointment of the same, by samples made and sent me by Mr. Geo. B. Evans, the well-known druggist of this city. The following details are important to those who wish to understand the nature and mode of preparing this peculiar compound.

Boro-glyceride is made by taking of boric acid sixty-two parts, and of pure glycerine ninety-two parts, and heating the mixture in a large evaporating dish, at a moderate heat, until the product ceases to lose weight. The residue will then be found to weigh but one hundred parts; that is to say, its manufacture entails a loss of over thirty-three per cent. This product, on cooling, is found to be a body very hygroscopic, resembling in consistency and appearance ice or glacial phosphoric acid. It appears, chemically, to be a solution of boric oxide in glycerine, which, on exposure, readily taking up water, converts the oxide into the acid. It is insoluble in either ether or fixed oils, but only soluble in water in the proportion of gr. xv. to the f. ʒ.

To dilute it, glycerine must be employed, and the best method for its preparation is, when freshly made, to add to it glycerine in the proportion to make a fifty-per-cent. solution. This makes a preparation of the consistency of honey,

to which can be added iodine, tannin, resorcin, carbolic acid, iodoform, morphia, atropia, etc., as may be desired. The ointment of boro-glyceride is made after the following formula:

℞	Sol. boro-glyceridi, 50 %,	ʒ ii.
	Gelat. petrolii,	ʒ vi.
M.	Olei rosar.,	q.s. ft. Ungt.

This makes a thoroughly stable ointment, which neither becomes granular nor precipitates the boric acid.

I was induced to experiment with fifty-per-cent. boroglyceride and the ointment at the suggestion of my friend, Dr. L. Webster Fox, and have been using the same in the treatment of certain diseases of the eye and ear. By its employment I was enabled to make several rapid cures of some tedious cases of chronic conjunctivitis, with more or less trachoma, and these successes in my private practice so encouraged me, that I determined on making its use general. I now submit the following group of cases as a proof of my success with it in a peculiar variety of specific ophthalmia.

Last October I was called in consultation to St. Joseph's Orphan Asylum, of this city, by Dr. John M. Keating, Attending Physician, for an outbreak of contagious (asylum) ophthalmia, which, with remarkable rapidity, had followed, as an epidemic, the admission, without Dr. Keating's consent, of a "sore-eyed" child to the institution. I found twenty-nine orphans, whose ages ranged from three and a half to eleven years, suffering from the usual form of blennorrhœic or contagious (asylum) conjunctivitis. About four fifths of the children had seemingly good constitutions, and the remaining one fifth were thin and scrofulous. Two others were recalled from a branch institution at Germantown, whither they had recently been sent, making thirty-one in all, and the whole number were quarantined. Sister Gonzaga, the Superioress, rigidly enforced the separate use of towels and basins, and the affected children's clothing was washed separately. All suffered from more or less acute symptoms, with photophobia, and lachrymal or mucopurulent secretions. The lids were, as a rule, but slightly swollen, and, although the ocular conjunctivæ were injected

and swollen, there were no corneal implications. Cleanliness and the use of a solution of fifty-per-cent. boro-glyceride, f. ʒ i. to water f. ℥ viii., was the only treatment instituted. Within a few days the discharge diminished, and the disease in each case passed into the subacute form, in which the lids became heavy and thickened, and, on eversion, showed commencing hypertrophic changes in the Meibomian follicles. This, the second stage of this disease, enables us to differentiate it from any other form of subacute purulent conjunctivitis. The only cases in which the trachoma nodules were flabby and moist were in the few thin, scrofulous children, where, upon everting the lids, the "fish-spawn" hypertrophies were seen involving both superior and inferior cul-de-sacs.

It is in this particular stage that the thickened lids, with their trachomatous linings, rub over and press upon the cornea, thus producing more or less pannus and inducing corneal complications. It was precisely at this juncture that I commenced the use of the fifty-per.cent. boro-glyceride. The cleansing was continued with care, and the honey-like solution was brushed over the everted lids or dropped into the eyes twice daily. The "ointment of the boro-glyceride" was used at bedtime, a small scrap being put into each eye. I was assisted, I gladly acknowledge, by the Superioress, a most thorough and intelligent nurse, a Sister of Charity, who has had years of experience in the management of children. She saw that my orders were carried out with military punctuality, and we had the satisfaction of seeing my treatment most successful; the majority of the cases began to improve in from two to three weeks. By this I mean the photophobia disappeared, the discharge became mucoid, and the hypertrophies commenced to shrink, first in the lower and then in the upper lids, and later to become isolated.

Although we commenced in October last, and since then have had several additions from the institution and some from Germantown, making forty in all, the epidemic is now so far under control that two thirds of the children have been discharged—that is, allowed the liberty of the

house, and they now mingle with the other one hundred and ten children of the institution. The latest additions and a few of the older cases, the scrofulous and marasmic ones, remain under treatment at the present writing, but are improving daily. The average time of treatment was two months, after which period I had no fear of further poisoning from the specific discharge. Slight pannus and superficial corneal ulceration occurred in but one case, and with this exception, although we had as complications dacryocystic blennorrhœa in two cases, and, in a third, double abscess and fistulæ of the sacs, there were no corneal implications whatsoever. To prove the virulency of the epidemic, my faithful nurse, the Superioress, was herself attacked with the disease, which was aborted by the use of a fifty-per-cent. solution of boro-glyceride, f. ʒ i., to tinct. opii camphorata and aqua āā f. ʒ ss.

When we pause to consider the history, course, and sequel of this baneful disease, which often runs a course of from two to three or even ten years, I feel confident that in the fifty-per-cent. boro-glyceride we have secured a most valuable addition to our list of local therapeutic agents. Sulphate of copper, locally, is still my favorite remedy for trachoma in general, but when called upon to combat so appalling an epidemic as I have mentioned, I feel much more secure—especially in the case of young children—when using this excellent remedy—the fifty-per-cent. boro-glyceride. On account of the great affinity of this solution for water, and the rapidity with which it absorbs it and liberates the finely subdivided particles of boric acid, which not only act as an astringent, but also as an antiseptic, I believe that it is just the substance we are in need of for the treatment of low grades of specific inflammations of the ocular conjunctiva. The use of the ointment mentioned, I consider an essential part of the boro-glyceride treatment, and it must be continued for at least two months after all

FOOT-NOTE.—In a marked case of chronic hypertrophic pericorneal conjunctivitis, called by Saemisch, Horner, and Arlt.[1] See Arlt: "Klin. Darstellung der Krankheiten des Auges," 1881, p. 7, spring catarrh, which I have had under treatment for the past three years, and for which I had exhausted the usual local therapeutics, the boro-glyceride (fifty-per-cent. solution and oint-

discharge has ceased. In my opinion, the fifty-per-cent. boro-glyceride has a brilliant future in ophthalmological therapy.

ment), after about six months' persistent use, has proved most efficacious. This disease exacerbates periodically, *relapsing each spring*. The hypertrophies become larger and phlyctenular-like but dense, and fibrous nodules appear upon the sclero-corneal margin, disappearing at the onset of cool weather. When the upper lid is everted its inner surface is trachomatous, and is divided by fissures between plate-like hypertrophies, which are as hard and dense as cartilage, and remind one of miniature alligator skin.

SOME RECENT THEORIES REGARDING THE PATHOGENY OF SYMPATHETIC OPHTHALMIA, VIEWED FROM A MACROSCOPIC STANDPOINT.*

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PROBABLY among the members of the Society present this evening there are some who can recall an amusing and not less instructive incident which happened in one of our local medical societies not very many years ago. A patient who had exhibited somewhat obscure symptoms, to obtain relief from her sufferings, sought medical advice. A suspicious-looking mass was discovered blocking up the posterior nares, and was removed without difficulty, having sloughed off, apparently, from its former attachments. The supposed neoplasm being regarded as probably of malignant character, it was, of course, deemed of the first importance that its histological structure should be determined; a portion of the tissue, therefore, was teased out, and submitted to microscopic examination. This completed, the growth was exhibited to the society in question, its histological characteristics were duly set forth, and the clinical facts of the case were related. An animated discussion followed, and more than one hypothesis was advanced to account for the unusual features which the case presented. While this was in progress, an inquisitive individual, with macroscopic proclivities, inspected the tumor with more care, it would seem, than had been previously thought requisite; and the

* A paper read before the Clinical Society of Maryland, Feb. 15, 1884.

debate was presently cut short by the announcement that the suspicious neoplasm was, after all, but a half-digested oyster, a harmless specimen of our should-be-familiar bivalve, which, probably, during a previous spell of vomiting had become lodged at the point where it was discovered.

There is a resemblance, not altogether fanciful it seems to me, between this oyster episode and the study of the pathogeny of sympathetic ophthalmia, as recently conducted by certain microscopists. Intent upon the "threads of fibrin," the "emigrant round cells," and the "microphytal organisms" which their microscopes reveal, these investigators appear to have lost sight of the macroscopic picture of the disease, with which, as clinicians, they should have been familiar, and as a consequence they have promulgated theories regarding its nature which are satisfactory only when viewed from the narrow standpoint of their authors.

Although Mackenzie and the other earlier writers upon sympathetic ophthalmia were disposed to regard the *optic* nerves as the probable route by which the inflammation extends from the primarily to the secondarily affected eye, this view, as is well known, was afterwards universally abandoned, and it was taught by all authorities, among them Von Graefe, Donders, and Bowman, that the *ciliary* nerves are the medium through which the sympathetic influence is transmitted, and that the inflammation in the second eye is not the result of direct extension from the one first affected, but is due to a morbific influence reflected through certain of the nervous centres. In support of this latter view, numberless observations have been recorded: as, for instance, the cases reported by Bowman and by Von Graefe, in which the starting-point of the sympathetic inflammation in the second eye occurred at a spot of the ciliary region which corresponded symmetrically to that at which the first eye had been injured; the numerous dissections, by Donders and a host of other competent observers, of eyes enucleated for sympathetic irritation or inflammation in the fellow-eye, in which the ciliary nerves exhibited signs of inflammation, were found torn, compressed, em-

bedded in the traumatic cicatrix, or subjected to unusual traction[1]; and the concurrent testimony of all ophthalmic surgeons, that sympathetic ophthalmia is especially prone to occur as a consequence of injury to those parts of the eye to which the ciliary nerves are chiefly distributed—the ciliary body and iris. So convincing, indeed, was the testimony offered from every quarter, that the mode in which sympathetic inflammation is propagated seemed settled beyond peradventure.

Within the past five or six years, however, all this has been changed, and now, if one may judge by the current literature upon the subject, the pathogeny of sympathetic ophthalmia is the one point in ophthalmology concerning which we are most in the dark, and hold views which are least defined. On the one hand, the disciples of Cohnheim would have us believe that it is impossible for an inflammation to be excited by an irritation reflected through the ciliary nerves; on the other, the germ theorists tell us of septic choroiditis, of microphytic organisms, and of peri-neural lymph-sheaths opening wide for their ready transmission. Now we are assured, in spite of all that we have been taught to the contrary, that in the exciting eye the ciliary nerves are rarely, and the optic nerve and retina almost invariably, the seat of pathological changes; and again we are reminded of the circle of Willis, and of the facility with which alterations in the choroidal vessels of one eye may be transmitted by way of the ophthalmic arteries, the internal carotids, and the circle of Willis to the corresponding vessels of the other.

To whom and to what, then, are we indebted for this astonishing change, for this sudden subversion of views which had been accepted and taught for the last quarter of a century by all the great masters of ophthalmology? If I mistake not, Dr. Adolph Alt, now of St. Louis, is entitled to the credit of having initiated the movement, by the publication, in December, 1876, in the ARCHIVES OF OPHTHALMOLOGY and OTOLOGY,[2] of a paper "On the anatomical

[1] Wells' "Diseases of the Eye," fourth Am. edition, note by the editor, Dr. C. S. Bull, p. 339.

[2] Vol. v., Nos. 3 and 4.

causes and the nature of sympathetic ophthalmia"; in which he gave a description of the pathological changes found in 112 eyes that had been enucleated on account of "sympathetic affection" of the fellow-eyes, and expressed the opinion that the statistics which he had accumulated "strongly sustained" the views of the earlier authors, "that the optic nerve plays a great part in the transmission of sympathetic ophthalmia." The all-pervading influence of the germ theory of disease has also played an important part; and still more important in favoring the change has been the influence of the theory of inflammation at present most in vogue, which regards "molecular alteration of the vascular walls as the indispensable condition for the development of inflammation," and "busies itself but little with the influence which the nerves may exert upon inflammation, or denies it entirely." [1]

Let us now consider the data brought forward by Dr. Alt, and see to what extent his conclusion, that they strongly sustain the view "that the optic nerve plays a great part in the transmission of sympathetic ophthalmia," is justified; and this it is the more important to do with care, because his statistics are quoted by all those who oppose the old theory of transmission, and are used as the basis of many of their strongest arguments. It is to be observed, in the first place, that the view he favors is that of *direct transmission of the inflammation by way of the optic nerve itself*, and not by way of the peri-neural lymph-space, as Leber and others have since suggested. Since he bases this conclusion upon the large percentage of "changes" in the retina and optic nerve, and the relatively small percentage of "changes" in the ciliary nerves, which he states the enucleated eyes exhibited, we shall direct our attention more especially to these points. "The percentage of changes in the retina and the optic nerve is remarkably great—79 per cent.," he states, and this he thinks "should engage very earnest consideration—the more so, as there are but 16⅔ per cent. which present changes in the ciliary nerves." [2]

[1] "Sympathetic Diseases of the Eye": Mauthner, Am. edition, pp. 109 and 112.

[2] Page 474, vol. v., Nos. 3 and 4, ARCHIVES OF OPHTHALMOLOGY and OTOLOGY.

In attempting to verify these figures, an unexpected difficulty presents itself at the outset, which is significant because of its bearing upon the accuracy of his methods. Although at the commencement of his paper Alt states that his statistics relate to 110 eyes enucleated on account of sympathetic affection of the fellow-eyes, 32 of which had been placed at his disposal by his colleagues, and the data regarding 78 had been compiled from literature, a careful count shows that 112 such eyes are described in the tabular compilation (80 derived from literature). His percentages, however, are based upon a total of 110 cases. Accepting the data *as given in the tabular compilation*, we find, as regards the ciliary nerves, that in 66 of the 112 cases no mention is made of their condition. In these cases it is probable that no attempt was made to ascertain whether they had undergone pathological changes or not; for, though one may cut open an enucleated eye, and detect at a glance the existence of detachment of the retina (and this condition, as we shall presently see, constitutes a very large part of the "retinal changes" to which so much importance is attached), a much more elaborate examination, involving usually the making of microscopic sections, is necessary to determine whether the ciliary nerves are the seat of pathological changes.

Disregarding, therefore, these sixty-six cases, and taking account only of the forty-six cases in which the condition of the ciliary nerves is mentioned, we find them described as "normal" thirty-one times, as presenting pathological changes of histological character six times, gross pathological changes (torn, compressed, lying in tissue of scar, etc.) seven times, both histological and gross pathological changes once, and "not discoverable" (apparently having been entirely destroyed) once. Considering the condition of the nerves in this last case as pathological, we have fifteen cases presenting either histological or gross pathological changes in the ciliary nerves in a total of forty-six, or 32.6[1] per cent. instead of 16⅔ per cent. as given by Alt. The

[1] In my calculations I have not thought it necessary to carry the fractions beyond the first decimal.

discrepance arises from the fact that he has taken account only of those cases (seven) which present *histological* changes.[1] It is a bad rule, however, which does not work both ways, as the old proverb tells us, and so we can not help thinking, since he uses the percentages of "changes" in the ciliary nerves, and in the retina and optic nerve, for comparison, that it would have been better for him to follow the same plan in obtaining the former that he adopted in calculating the latter. This, however, has not been done, for the 79 per cent. of changes in the retina and optic nerve, which he gives, includes the many cases in which only gross changes (chiefly detachment) of the retina are described. Moreover, although no intimation is given of the fact, the 16⅔ per cent. of changes in the ciliary nerves has reference to only the forty-three cases in which their histological condition is mentioned, while the 79 per cent. of retinal and optic-nerve changes refers to the whole series of one hundred and ten (as given by him) cases. Furthermore, he certainly does not mean what he says, when he speaks of 79 per cent. of the eyes exhibiting changes in the "optic nerve *and* retina," [2] for a careful survey of the table shows that only 27, or 24.1 per cent. of the one hundred and twelve eyes, exhibit changes in *both* the retina and optic nerve. The condition of the retina itself is mentioned in eighty-one cases; once it is spoken of as "wanting," and in every other instance pathological changes, either histological or gross, are described, partial or complete detachment being named 63 times. That is to say, the retina is in an abnormal condition in 100 per cent. of the cases in which its state is referred to, or 72.3 per cent. of the whole number of eyes. The optic nerve is mentioned 32 times, or in 28.5 per cent. of the cases, pathological changes—including atrophy 14 times, and optic neuritis 6 times—being described in each instance. In 76.7 per cent. of the cases (or upon his basis of 110 eyes in 78.1 per cent.) pathological changes affecting either the retina or optic nerve, or both, are found, and it is to this, probably, that the 79 per cent. of changes

[1] As he states on p. 472.

[2] *Op. cit*, pp. 472 and 474. Italics my own.

in the optic nerve *and* retina, as he expresses it, refers. Had he followed the same rule in regard to the optic nerve and retina that he did with the ciliary nerves, and taken account only of those cases in which *histological* alterations are mentioned, his percentage of pathological changes would have been reduced from 79 to about 40.

A striking contrast, as regards the condition of the ciliary nerves, is brought out, if we group separately Alt's own cases, and those which he has taken from literature. Thus, in the 31 cases of his own in which the ciliary nerves are mentioned, they are described as normal 26 times, or in 83.8 per cent. of the eyes, and as presenting histological or gross pathological changes 5 times, or in only 16.1 per cent.; while in the 15 cases from literature in which they are spoken of, they are described as normal in but 33⅓ per cent. of the eyes, and as pathological in 66⅔ per cent.

In the ARCHIVES OF OPHTHALMOLOGY, September, 1881,[1] Dr. W. C. Ayres, of New York, gives the notes of 4 eyes enucleated for sympathetic inflammation, and 3 for sympathetic irritation, which he examined microscopically, and in every one of which he discovered pathological changes in the ciliary nerves. If we add these to the 15 cases taken from literature by Alt, we have a total of 22 cases, in which the ciliary nerves are pathological 17 times, or in 77.2 per cent., and normal only 5 times, or in 22.7 per cent. In the same paper there is reported also a case in which an eye containing a gun-cap was enucleated for iridocyclitis purulenta. In this instance the fellow-eye "had manifested *no sympathy*, and the examination of the enucleated eye revealed the very significant fact "that every [ciliary] nerve-bundle * * * examined was completely degenerated, and divided somewhere in its course by accumulations of small round cells."

The next point worthy of comment is, that Alt should have found the ciliary nerves histologically normal (and showing gross pathological changes but twice) in fourteen of the fifteen eyes enucleated on account of sympathetic

[1] Vol. x., No. 3, p. 277 *et seq.*

irritation, which were submitted to him for examination, their condition in the one remaining eye not being mentioned. Here, it seems to me, he is unfortunate in proving too much; for even the most uncompromising opponent of the doctrine that sympathetic ***inflammation*** is transmitted through the medium of the ciliary nerves, admits, at least, that sympathetic ***irritation*** is propagated in this way. So that we are forced to conclude, either that an eye in which the ciliary nerves are entirely normal may excite sympathetic irritation of such serious character as to justify its enucleation; or else, what is much more likely, that pathological changes capable of causing such sympathetic symptoms may exist in the ciliary nerves of the exciting eye (affecting most probably not their trunks, but their terminal filaments in the iris and ciliary body), and yet be entirely undetectable with the microscope.

As to the 79 per cent. of pathological changes in the "retina and optic nerve," to which Alt and those who quote his statistics attach so much importance, they are clearly of little significance in so far as they have any bearing upon the question of the mode of transmission of sympathetic ophthalmia. In the first place, it is manifest that almost every eye in which these changes were discovered had been the seat of disorganizing inflammation, which had, indeed, involved the retina and optic nerve, but only in common with all the other important structures of the eye, including the iris, ciliary body, choroid, lens, and vitreous humor. Indeed, Alt himself admits [1] that in the whole series of cases there is but one "in which there was an affection of the retina without coincident affection of the uveal tract." In the second place, when we examine into the character of the changes which go to make up the total of 79 per cent. (as given by Alt, but 76.7 per cent. according to my calculation), we find that in a large majority of the cases they consist in detachment of the retina, or in atrophy or excavation of the optic nerve, optic neuritis and retinitis being mentioned each but six times, and being concurrent, moreover, in five instances. That detachment of the

[1] On p. 474.

retina, by causing traction upon the ciliary body, might influence the development of sympathetic ophthalmia (supposing that it is propagated through the ciliary nerves), may readily be believed, but it will scarcely be maintained that it could do so, if the hypothesis that the sympathetic affection is the result of a progressive optic neuritis be accepted as correct. And it is quite as manifest that the excavated and atrophic optic nerves, which figure so frequently in the tables, are incapable of producing such a result. If it be urged that the atrophy indicates antecedent neuritis, it may be said, in reply, that the condition of optic-nerve atrophy occurs with especial frequency in the eyes which were enucleated on account of sympathetic *irritation;* so that in these cases, at least, the neuritis must have run its course, and disappeared, without the inflammation having extended to the second eye. With these three classes of cases thrown out, the percentage of retinal or optic-nerve changes, dwindles into insignificance, especially when the graver pathological alterations with which these changes were in almost every instance associated are taken into account.

No! If we would discover the true significance of Alt's statistics, we must not look to the data bearing upon the condition of the optic nerve and the retina, but to those which have reference to the cornea, iris, and ciliary body. Here we meet with the old familiar story—iritis and cyclitis, plastic or purulent, recurring again and again; foreign bodies in the ciliary region; corneal wounds with incarceration of iris; sclerotic wounds with involvement of ciliary body;—these are the conditions which are enumerated in an almost unbroken series from the beginning to the end of his tables. Only once in the whole series of one hundred and twelve cases is evidence wanting of the uveal tract being the seat of pathological changes,[1] and but for the scantiness of the information given in regard to this case (in which there seems to have been a gunshot wound of the eye), even this single exception would probably not have to be noted.

[1] Waldeyer's Case (31), p. 426.

In a word, we fail to find any justification, whatever, for the conclusion reached by Alt (and which has been accepted by so many), that the data he has brought together strongly sustain the view that the optic nerve plays an important part in the transmission of sympathetic ophthalmia; but, on the contrary, we are convinced that if his statistics be examined in an unbiassed spirit it will be found that it is the old theory, which attributes to the ciliary nerves the important part in the production of sympathetic ophthalmia, that is, in reality, "strongly sustained."

As to the *clinical* evidence which has been relied upon to support the view that sympathetic ophthalmitis is the result of a progressive optic neuritis which extends from the primarily to the secondarily affected eye, it proves upon examination to be as inconclusive as the pathological testimony which we have just examined. Vose Solomon and Mooren, for example, each report a case in which sympathetic inflammation appeared after enucleation of the exciting eye, and as they had the misfortune to employ defective scissors to divide the optic nerve with, they rush to the absurd conclusion that the sympathetic affection was due to the bruising of the optic-nerve fibres, and hence that the inflammation must have spread by this route. It is scarcely necessary to point out, as Brudenell Carter has already done in alluding to Solomon's case,[1] that the ciliary nerves must have participated in the unusual laceration to which the optic nerve was subjected; so that as far as the question of transmission is concerned, these cases are without significance, and may be quoted with the same show of reason in support of either the ciliary-nerve or the optic-nerve hypothesis. It may be remarked also in regard to these cases, as well as of the frequently quoted cases of Colsmann and Hugo Müller (in which a neuro-retinitis developed in the uninjured eye a few days after the enucleation of the other), that not only is there no ground for supposing that the sympathetic outbreak was in any way dependent upon the *cutting of the optic nerve*, but that it is not improbable that the attack would have occurred, exactly

[1] "Diseases of the Eye," Am. edition, p. 115.

as it did, had the exciting eye not been enucleated. Indeed, it would be entirely unjustifiable to assume, in the cases of Colsmann and Hugo Müller, that the operation bore any such relation to the inflammatory outbreak in the second eye as usually exists between a traumatism of an eye and the sympathetic disease which it induces, because of the briefness of the interval that separated the two events. The most that can be claimed is, that the sympathetic attack, which was imminent, was precipitated by the shock of the operation; and admitting this, it seems much more likely that the determining influence was transmitted through the ciliary nerves than through the optic. As to the interesting case reported by S. C. Ayres,[1] in which a sympathetic inflammation that had made its appearance some time after enucleation of the other eye was cured by resection of the optic-nerve stump, it is evident, since the patient suffered severe and persistent pain in the empty socket, which certainly could not have been dependent upon irritation of a nerve of special sense, such as the optic, that some of the orbital branches of the fifth nerve, probably the remains of the ciliary nerves which had become involved in the cicatricial tissue about the optic-nerve stump, were in a pathological condition; and it is equally certain, since the resection relieved both the pain and the sympathetic inflammation, that it included these branches as well as the extremity of the optic nerve. Probably a condition existed here not unlike that which Dr. Poncet found on enucleating an eye for sympathetic mischief, upon which an optico-ciliary neurectomy had been previously performed without beneficial effect. The case was reported by him to the Ophthalmological Section of the International Medical Congress, London, 1881. The ciliary nerves were embedded in a dense mass of cicatricial tissue, which had formed about the posterior pole of the eye as a consequence of the previous operation, and exhibited marked inflammatory changes. In commenting upon the features of this case, Dr. Poncet alluded to the possibility of a similar condition occurring after enucleation, and suggested that the devel-

[1] ARCHIVES OF OPHTHALMOLOGY, vol. xi., No. 2, p. 199.

opment of sympathetic inflammation after removal of the exciting eye might be explained in this way.[1] Upon this point Mauthner remarks: "I think that in every case in which we have been obliged to ascribe the outbreak of sympathetic symptoms to the enucleation itself, or to the introduction of an artificial eye, we have, so far, observed that the region in the bottom of the orbit which was occupied by the stump of the excised nerve, and its accompanying ciliary nerves, was sensitive to the touch, as well as that the conjunctiva lining the cavity was swollen, red, and painful."[2]

But, even supposing there are no evidences of inflammation in any of the orbital branches of the fifth nerve, it is still quite unnecessary to adopt the progressive optic neuritis hypothesis in order to account for the origin of sympathetic inflammation, or the persistence of sympathetic irritation, after enucleation of the exciting eye; for it is altogether probable that the disturbances of nutrition in the second eye are preceded by, and are dependent upon, molecular alterations (perhaps a slight myelitis, as suggested by Brecht) in the vaso-motor or "trophic" centres, and that these again are secondary to alterations of similar character in the Gasserian and ophthalmic ganglia; so that we need only suppose that in exceptional instances these changes have progressed so far as not to be arrested by the enucleation of the eye, to obtain an entirely satisfactory explanation of the etiology of these anomalous cases.

The occasional occurrence of sympathetic "*neuro-retinitis*" is urged as an additional argument in favor of the view that the optic nerve is the route by which the inflammation reaches the second eye. It is worthy of remark, however, that it is always a neuro-*retinitis*, and never a pure *neuritis* or *papillitis*, that is spoken of. Mauthner refers to a number of cases of sympathetic choroido-retinitis, a few cases of retinitis, and a still smaller number diagnosticated as neuro-retinitis; but, though he devotes a paragraph to "sympathetic af-

[1] See Transactions of the Seventh International Medical Congress, vol. iii, p. 39.

[2] "Sympathetic Diseases of the Eye," Mauthner, English translation, p. 136.

fections of the optic nerve,"[1] he alludes only to a few doubtful cases of simple atrophy, and makes no mention whatever of neuritis. It is safe to say, I think, that no case of sympathetic optic neuritis has yet been recorded in which there were not indications of the coexistence of inflammation of at least the adjacent portions of the choroid and retina. Now, it is well known that an intimate anastomosis exists between the blood-vessels of the optic disc and those of the surrounding choroid, and that hyperæmia of the former and indistinctness of its outline frequently accompany even the slightest grades of choroiditis. It is also known that the short ciliary nerves, which enter the eyeball around and in close proximity to the optic nerve, give off many branches to the neighboring choroid—in fact, that the posterior segment of the choroid is especially rich in its ciliary-nerve supply.[2] That sympathetic inflammation, therefore, which usually commences as an irido-cyclitis, should occasionally begin as a posterior polar choroiditis, the inflammation quickly involving the retina and optic nerve, is exactly what we might expect, if it be dependent upon an influence reflected through the ciliary nerves; and this, we believe, is the true explanation of most, if not all, of the cases of so-called neuro-retinitis of which we have of late heard so much.[3]

A further objection which may be urged against the theory of a progressive optic neuritis is this: If the inflammation which has spread from the exciting eye reaches the second eye as a simple descending neuritis, we should expect only such results as usually follow neuritis of this character, that is to say, ultimate atrophy, perhaps, of the optic nerve and retina, but little, if any, implication of the uveal tract, certainly none of its anterior portion—the ciliary

[1] *Op. cit.*, p. 92.

[2] H. Müller, Schweigger, Stellwag, Pope, etc. See "Anatomy and Histology of the Human Eye," Metz, p. 39.

[3] Even a pure sympathetic neuritis might, of course, be produced by a reflex influence dependent upon irritation of the ciliary nerves. Anatomists (Hirzel and Tiedemann) assert that a twig from the ophthalmic ganglion enters the optic nerve with the arteria centralis retinæ. In view of this fact, we should heed the advice which Alt gives (upon other grounds), to remove a large piece of the optic nerve when we enucleate an eye for present or threatening sympathetic disease.

body and iris. It is scarcely necessary to say, however, that such is not the case, but that even when the inflammation commences at the posterior pole of the eye, it usually spreads to the anterior portion of the uveal tract, and terminates in a malignant irido-cyclitis.

In regard to the case of sympathetic iritis reported by Alt in the ARCHIVES OF OPHTHALMOLOGY, vol. viii, No. 1, in which he thinks the inflammation was "mechanically" transmitted to the second eye by way of the optic nerve, because there was found in the enucleated eye "a very active inflammatory process in the optic nerve and retina, while the ciliary nerves appeared perfectly unaltered,"[1] we think it would be difficult for him to explain, in accordance with this view, how the inflammation reached the iris of the second eye; and still more difficult to explain how, when it had reached this point by "mechanical extension," it was arrested, as he claims it undoubtedly was, by the enucleation of the other eye. On the other hand, these difficulties at once disappear, if we assume that the influence which determined the development of the iritis in the second eye was reflected through the ciliary nerves, and was dependent upon an irritation of their terminal filaments in the inflamed iris and ciliary body of the exciting eye, the normal condition of their trunks in this eye being, in fact, conducive to such reflected action; for not only is the question of the origin and location of the sympathetic inflammation disposed of at once, but we are enabled to comprehend how the enucleation of the primarily affected eye favorably influenced the condition of the fellow-organ, by relieving it of a continuously acting source of irritation.

The influence which *the germ theory of disease* has exerted upon the question of the pathogeny of sympathetic ophthalmia, to which reference has been made, is exhibited in the now-popular septic choroiditis and perineural lymph-space doctrine advanced by Leber, and advocated, notably, by Snellen, before the Ophthalmological Section of the London International Medical Congress, (1881). Concerning this

[1] Page 106.

doctrine, which regards sympathetic ophthalmitis as *an inflammation of septic character, that has spread from the primarily to the secondarily affected eye by way of the inter-vaginal lymph-space of the optic nerve*, it is to be said: that the evidence adduced in its favor is extremely meagre; that the arguments by which it is supported are inconclusive; and that, at best, it is of but limited application. Leber, for example, adopts this theory mainly in consequence of having found pronounced hyperplasia of the inter-vaginal connective tissue of the optic nerve, with proliferation of the endothelium, in four eyes enucleated for sympathetic trouble[1]; and Snellen, though he points out how the coincidence of an infective plastic inflammation of the uveal tissue, with closure of the anterior and dilatation of the posterior lymphatic spaces of the eye, might produce such septic transferrence, has little additional testimony to offer, beyond the statement that the tension of the exciting eye constantly increases before the second eye is affected, and his observation, in a freshly prepared microscopic specimen from an eye just enucleated on account of a serious traumatism received three weeks previously, of a mass of moving molecules, which were presently recognized as being for the most part pigment molecules from the uveal tissue, though "several somewhat larger bodies showed by their ampler movements all the characteristics of micrococci."[2] The former argues that the pertinacity of sympathetic ophthalmitis, its frequent relapses, and its involvement of so many different parts of the eye, render probable its infectious origin; but this certainly is an unwarrantable conclusion, since the severer forms of herpes zoster ophthalmicus (which is perhaps more nearly related to sympathetic inflammation, and in some respects resembles it more closely, than any other variety of ophthalmia) present just such characteristics. The occasional occurrence of sympathetic inflammation after enucleation of the exciting eye, he also alludes to as having a similar bearing; but of this we

[1] *Archiv für Ophthalmologie*, vol. xxvii, 1, p. 325 *et seq.*

[2] Transactions of the International Medical Congress, Seventh Session, London, 1881, vol. iii. p. 31 *et seq.*

have already spoken, giving it quite a different interpretation.

The first and most obvious objection to this doctrine (which Leber himself appreciates) is, that sympathetic inflammation almost always begins in the anterior portion of the uveal tract, and not in the region of the optic nerve, as should be the case if this view were correct. Leber, indeed, suggests that neuritis may always be present without being recognized, owing to the turbidity of the vitreous humor; but, as the neuritis should manifest itself first, it ought to be more frequently observed before the inflammatory process has extended to the uveal coat and rendered the media cloudy. Indeed, if there be any truth in Leber's other theory, that papillitis, or choked disc, is dependent upon the presence of a phlogogenic fluid in the optic-nerve intervaginal space,[1] then, if his view of the etiology of sympathetic ophthalmia were correct, it would seem that just this condition of a well-marked neuritis should be the most frequently met with and the most characteristic feature of the disease; but, as has been said, papillitis, or choked disc, appears to be the one form of sympathetic inflammation which has not been recorded. Moreover, if papillitis and sympathetic ophthalmitis resemble each other as closely in their etiology as Leber would have us believe, it seems not impertinent to inquire why they should differ so absolutely in their clinical history. Again, it may be said, that if the description usually given by anatomists of the intervaginal space of the optic nerve be correct, namely, that it ends abruptly in the sclerotic tissue about the optic-nerve entrance, being cut off from the deeper tissues of the eye by the interposition of the pial sheath, which at this point turns out to blend with the inner third of the sclerotic, the dural sheath being lost in the outer two thirds, it is difficult to understand how the inflammatory process spreads hence to the ciliary body and iris. Some authorities claim that there are lymph-spaces in the lamina cribrosa which communicate directly with the intervaginal space, but this Leber, himself, has denied.[2] The occurrence of dropsy of the

[1] *Op. cit.*, p. 52 *et seq.*

[2] Trans. Seventh International Med. Congress, (1881), vol. iii., p. 55.

intervaginal space, with distention of the ocular end of the nerve-sheath, seems also to indicate the absence of any direct communication between this cavity and the interior of the eye.[1]

Another serious objection to this theory is, that in many instances the condition of the exciting eye, at the time of the sympathetic outbreak, is not such as to warrant the assumption that it is the seat of a plastic or septic uveitis. I have already alluded to a case in my own experience, in which a sympathetic neuro-retinitis (or more accurately, perhaps, a posterior polar choroido-retinitis) developed in consequence of a very severe and obstinate traumatic keratitis of the opposite eye. The corneal inflammation was caused by the instillation into the eye of aqua ammonia, which had been mistaken for a collyrium, and, although for months the keratitis persisted, and the eye remained extremely irritable and photophobic, there was certainly at no time any serious implication of the uveal tract. My notes show that a short while before the sympathetic inflammation made its appearance, the vision of the injured eye was tested, and that, in spite of a very considerable amount of corneal cloudiness and irregular astigmatism, the patient was able to read with it J. No. 8. The irritability of this eye gradually disappeared, and after a protracted treatment, which consisted chiefly in the administration of iodide of potassium and biniodide of mercury, and the application of the artificial leech, the sympathetic inflammation slowly subsided.[2]

The irritation caused by the incarceration of a tag of iris in a corneal scar, as in the now discredited operation of

[1] Dr. Wm. F. Norris, of Philadelphia, using the bodies of young children, succeeded without difficulty in filling the intervaginal space of the optic nerves by injecting fluids through the anterior fontanelle into the subarachnoid space. But, though his injections "filled also the lymph-spaces of the spinal cord and of the nerves given off by it," only in a few instances, "with high pressure," did they penetrate from the subdural to the perichoroidal space.—*Phila. Med. Times*, vol. ix., p. 567.

[2] Brailey, speaking of the possibility of sympathetic inflammation travelling along the intervaginal space, states, "that the inflammation of this is usually extremely slight, compared with that of the uveal tract itself, and that sympathetic inflammation may occur without any implication of the choroid in the neighborhood of the papilla of either eye." Trans. Seventh International Med. Congress (1881), vol. iii., p. 38.

iridodesis, has not infrequently provoked a sympathetic ophthalmitis, without exciting in the primary eye a serious amount of inflammation [1]; and a shrunken stump, in which all inflammation that could possibly be regarded as of infectuous character had long since subsided, has often done the same.

Lastly, it may be said, that there is one well-recognized form of septic inflammation of the uveal tract—suppurative or metastatic choroiditis,—and that the clinical history which it presents is wholly unlike that of sympathetic inflammation. In order to fortify his theory Leber attempts to explain the well-known fact that suppurative panophthalmitis rarely gives rise to sympathetic inflammation, by assuming that the septic germs "are partly gotten rid of by purulent perforation of the eyeball, and partly destroyed or rendered inert by enormous development of pus." I submit, however, that the etiology of this disease, and the consequences which not infrequently flow from it, prove it to be the typical infectious ophthalmitis, and that it, above all other forms of ocular inflammation, would be most apt to excite sympathetic ophthalmia, were the theory of its pathogeny which Leber has promulgated true.

Finally, to the many, ever ready to follow each swing of the pendulum of popularity, who would cast aside as of no value all that clinical observation has taught us concerning the pathogeny of sympathetic ophthalmia, *because it happens not to harmonize with the latest dictum of the latest school of pathology*, I would say: that though the predominant school of pathology at the present day may busy itself but little with the influence which the nerves may exert upon inflammation, as Mauthner remarks, it is certainly not in a position to demonstrate that no such influence is exerted; and that while the experiments of Professor Ludwig, showing that the chorda tympani conveys to the submaxillary gland a specific stimulus to secretion, re-

[1] Compare "Sympathetic Diseases of the Eye," Mauthner, English translation, p. 48.

move all *a priori* objection to the theory that inflammatory changes of texture may be produced by centrifugal "trophic" nerves,[1] there are many clinical facts, beside the almost convincing ones which the phenomena of sympathetic ophthalmia furnish, that go far to prove that either through "trophic" or vaso-motor fibres, or through both, nerve influence does determine such tissue changes.[2] I would also remind them, that though it is the fashion of the day to accept as conclusive the well-known experiments by which Snellen supposed he had demonstrated that the sloughing of the cornea which follows division of the trigeminus is a traumatic, and not a neuro-paralytic phenomenon, others (Samuel, Meissner, Schiff) have experimented in this same field, and have obtained results which led them to adopt directly opposite views; and that so close an observer and logical a reasoner as Von Graefe rejected absolutely Snellen's conclusions, (as very many ophthalmologists have done since,) because he found them opposed to facts with which his clinical experience brought him into daily contact;[3] also, that in the reports of nearly all eye hospitals there are recorded cases of neuro-paralytic keratitis, and that within the past few years ophthalmic surgeons have shown a disposition to attach more and more importance to diseases of this type—diseases, as Brudenell Carter aptly expresses it, which are essentially neuropathic in their character, and differ from neuralgia chiefly in this

[1] See article on Inflammation in "Holmes' System of Surgery," vol. I., p. 90.

[2] Among the most striking may be mentioned the well-known observations recorded by Mitchell, Morehouse, and Keen,) Gunshot Wounds and other Injuries of Nerves, Phila., 1864; Circular No. 6, Surgeon-General's Office, 1864); the cases of reflex structural changes due to dental disease, described in Guy's Hospital Reports (third series, vol. xiii.) by Mr. Salter; and the ulceration of the duodenum which occurs so frequently in consequence of extensive burns of the surface of the body, and which Brown-Séquard succeeded also in producing experimentally. The statement of Mooren that he has seen cases of optic neuritis which were dependent upon uterine displacement, and which disappeared when this was corrected, may also be mentioned in this connection.

[3] One can readily believe that the corneal inflammation and ulceration that supervene upon division of the trigeminus might be favorably modified by keeping the lids closed over the eye; but the suggestion that the ulcerative and necrotic changes which result in the destruction of the cornea within forty-eight or seventy-two hours after the section of the nerve are due simply to the injury to which the eye is exposed, owing to its anæsthetic condition, seems preposterous. Certainly, if we may reverse the usual order, and reason from man to the rodentia, we should be warranted in so regarding it.

respect, that they declare themselves by abnormal tissue change instead of by abnormal sensation.[1] And, lastly, I would point out to them, that though the pathologists of the Cohnheim school contend that the reflex congestion which follows stimulation of sensory nerves is not inflammation, and does not lead directly to it, they admit that when this condition has existed for some time (as in the premonitory stage of sympathetic ophthalmia) it places the cells of the part in a condition of instability, lowers the vitality of the capillary walls, and offers facilities for the emigration of leucocytes; so that at any moment, upon the slightest provocation, (in the case of the eye, for example, from the irritation caused by overwork or undue exposure to light[2]) inflammatory changes may be precipitated.[3] So that, after all, they may accept the Cohnheim doctrine in its entirety, and at the same time, without being illogical, they may believe what clinical evidence so plainly declares—that sympathetic ophthalmitis is dependent, if not directly, at least secondarily, upon a reflex influence transmitted through the ciliary nerves.

Briefly summarized the conclusions which seem to me to be warranted by the facts we have examined are:

1st. That the doctrine that sympathetic ophthalmia is the result of a progressive optic neuritis, which spreads from the primarily to the secondarily affected eye, is supported by no facts worthy of serious consideration, but is the out-

[1] "Diseases of the Eye," Am. edition, p. 113. Also compare Noyes: "Diseases of the Eye," p. 190; and see an interesting article in the *Am. Journal Med. Sciences*, July, 1881, by Dr. Jas. L. Minor: Anæsthesia of the Cornea, and its Significance in Certain Forms of Eye Disease, in which he makes the significant statement that "*anæsthesia of the cornea existed in six [of his] cases without keratitis; and in those cases that presented both anæsthesia and inflammation, complete protection of the eye did not materially alter the course of the disease.*"

[2] Brailey (Trans. London Med. Congress, 1881, vol. iii., p. 38) mentions that sympathetic inflammation frequently occurs shortly after patients leave the hospital; and he attributes this to the exposure of the second eye to light. He also states that the records of Moorfield's Hospital "show that a wound occurring in the summer months is more liable than one in the winter to be followed by sympathetic disease" and "that sympathetic inflammation is more likely to break out in summer, irrespective of the time when the first eye was injured."

[3] See the very interesting (Bradshaw) lecture on The Influence of the Sympathetic on Disease, by Dr. Edward Long Fox, *British Med. Journal*, Aug. 26, Sep. 2, 1882.

growth of grossly misinterpreted clinical and pathologico-anatomical observations.

2d. That the septic choroiditis theory of Leber rests upon evidence which is scarcely more substantial; and from both an anatomical and a clinical point of view is open to serious objection.

3d. That there is an overwhelming preponderance of testimony, both clinical and pathologico-anatomical (which, however, for obvious reasons, it has been the fashion of late to systematically belittle), in favor of the-one-at time universally accepted doctrine that sympathetic ophthalmitis, like sympathetic irritation, is a reflex neurosis, dependent upon irritation of the ciliary nerves of the exciting eye (probably for the most part of their terminal filaments in the ciliary body and iris)[1]; and that as this testimony goes far to show that inflammatory changes of texture, as well as abnormalities of sensation, may be produced by reflex nerve influence, it has a very important bearing upon the theory of the etiology of inflammation at present most in favor.

4th. That, as the history of the last quarter of a century plainly shows, experimental pathologists, as well as clinicians, are liable to fall into error, and that for this reason it behooves the latter to be less eager to cast aside as untrustworthy the lessons they have learned from the daily observation of disease, because they may seem to conflict with the dicta which the laboratories from time to time give forth.

[1] That in some instances inflammatory changes occur in the second eye without well-marked sympathetic irritation, and that in others sympathetic irritation of the most marked character exists for a long time without inflammation, does not militate against the view that both of these conditions are dependent upon a reflex influence transmitted through the ciliary nerves, as some would have us believe. In the first place, the ciliary nerves contain sympathetic as well as sensory fibres, and it is probable that the former have most to do with trophic changes, the latter with disturbances of sensation. In the second place, in view of the astonishing difference in the degree of pain inflicted in different persons by the same amount of violence done to the nerves, we are justified in assuming that in the eye, as well as in other parts of the body, these two kinds of fibres do not always exist in the same relative proportion, or, at least, that in different individuals, sometimes the influence of one set, and sometimes the influence of the other, may predominate. Admitting this much, we shall have no difficulty in comprehending why a given lesion of the ciliary body, for example, should give rise, in one instance, to pronounced sympathetic irritation unaccompanied by structural changes; and in another, to trophic changes in the sympathizing eye with little or no accompanying irritation.

BLINDNESS FROM THROMBOSIS OF THE RETINAL VESSELS IN FACIAL ERYSIPELAS.*

By H. KNAPP, M.D.

(*With two chromo-lithographic plates, Arch. of Ophth., xiii., A and B.*)

THE text-books of general medicine give only very meagre information concerning blindness from facial erysipelas. Zuelzer in Ziemssen's "Cyclopedia," second volume of the German edition, 1874, p. 447, mentions as ocular symptoms in the course of erysipelas: "photophobia, conjunctivitis, corneal ulcers, retrobulbar abscess, gangrene of the eyelids, atrophy of the eyeball; further glaucoma (?), neuro-retinitis, and atrophy of the optic nerve and retina." This, with the names of a few authors in brackets, is all that we learn from this extensive work on a—fortunately not frequent—symptom of a very common disease, but a symptom which in its importance is second only to the preservation of life. Alfred Stillé, in Ashhurst's "International Encyclopædia of Surgery," 1881, vol. i., p. 185, translates ten lines from a paper of Parinaud in the *Archives générales de médecine*, June, 1879, pp. 641–660; and additionally on page 190 he says: "Finally, blindness has been known to result from erysipelas of the face, as in the case of Despagnet—(*Recueil d' ophthalmologie*, Paris, 1880)."

In 1880 Prof. Theo. Leber, of Göttingen, in an admirable paper: "Orbital Abscess and its Connection with Erysipelas and Thrombophlebitis,"[1] compiled the literature on the subject up to that time, and adds, from his own practice,

* Read in parts before the Am. Ophthalmol. Soc., July, 1883, and before the Med. Soc. of the County of New York, March 24, 1884.

[1] *Graefe's Archives*, vol. xxvi., part 3, pp. 212–263.

the history of an important case (case 2, p. 224) which terminated fatally.

In 1882 Dr. A. Schwendt, on the suggestion and under the auspices of Prof. H. Schiess, of Basel, wrote a monograph of 270 pages on "Orbital Phlegmon." Among the forty-four cases which he collected from the literary sources at his command thirteen were the result of erysipelas. To the twenty-one cases compiled by Leber and Schwendt I can add twelve others from literature, and from my own practice one which, observed with the ophthalmoscope from the very beginning, through all its stages, shows some new features, and may contribute to clear up some hitherto obscure points. Though the interest of this paper will centre in this observation, a systematic review of the more important cases already published may not be considered superfluous repetition. Schwendt divides the cases of blindness from erysipelas into three classes:

1. Cellulitis confined to the orbit.
2. Cellulitis extending from the orbit to the brain.
3. Optic-nerve atrophy without orbital cellulitis or exophthalmus.

Without following this comprehensive classification let us begin our considerations with Schwendt's last group.

We first find two cases of **H. Pagenstecher** (12).[1]

In the **first** the erysipelas occurred after a slight injury to the left eyelid, and showed swelling, redness, and tenderness of the lids; moreover, as the patient stated, the eyeball was painful and moved with difficulty. In two weeks the swelling of the lids had disappeared, but the eye was totally blind. When Dr. Pagenstecher saw him for the first time, which was seven weeks after the onset of the erysipelas, the external appearance and tension of the eye were normal; moderate mydriasis, absolute amaurosis, media clear, optic disc white, retinal vessels markedly atrophic. The other eye normal.

In **Pagenstecher's second case** (13) "the eyes were, as the patient expressed himself, quite shut up with swelling but not protruded or painful." The erysipelas of the face and head lasted three weeks, and left impairment of sight in both eyes. S = $\frac{15}{100}$. Odd. reddish-white; calibre of vessels reduced.

[1] The numbers refer to the bibliography at the end of the paper.

In **Mr. J. Hutchinson's case** (15) both eyes were very much swollen. In the first few days the patient could see well with both eyes. Then the disease increased and for several days the lids were closed. When next he was able to open them he found the right eye quite blind. Six weeks after his illness Dr. Hutchinson found the od. pale, the retinal arteries small, the veins normal. S = o.

On these three cases rests the supposition that the amaurosis may be produced without orbital cellulitis. Schwendt adds to them the first case of Jaeger, but Jaeger mentions in the clinical history that there were swelling of the lids and protrusion of both eyes. Pagenstecher's first case can fairly be excluded from this group, for the patient "stated that he had slight pain in the ball of the eye and some little difficulty of moving it." Any one familiar with the symptoms of the disease will regard this as direct evidence of the presence of orbital cellulitis. Hutchinson says of his case: "There is no reason to think that the cellular tissue of the eyeball was especially involved. * * * I have seen several other cases in which an eye has been left blind after an attack of erysipelas of the face, but in most I think that the erysipelas had been more severe, and had affected the cellular tissue of the orbit more definitely." This statement is not sufficient to exclude the existence of orbital cellulitis in the case he describes. It may have been present, but not noted on account of the swelling and closure of the lids. Hutchinson saw the patient six weeks after recovery. Thus only one case is left, Pagenstecher's second, where it is expressly mentioned that the eyes were neither protruded nor painful. But this statement is made by the patient only. The erysipelas must have been quite severe, for it "spread over the whole upper part of the head," and lasted three weeks. Though nothing is more dangerous, in our reasoning, than to supply desirable facts by hypothesis, yet we all know how defective many clinical histories are. In the case before us, where the eyes were quite shut up with swelling, a low degree of orbital cellulitis may have been easily overlooked.

Leaving this case out of consideration as evidence either

pro or con, we shall find that **orbital cellulitis** *is present in all the cases where blindness occurred during the course of facial erysipelas.*

E. Jaeger communicates two cases, accompanied by drawings of the ophthalmoscopic condition after the disease had run its course. These drawings and that of Hoesch (see later on) are the only ones that I have found to illustrate the disease under consideration.

Jaeger's First Case (10).—After severe exposure, erysipelas of the right side of the face and head. Intense fever. Delirium two days. Both lids of both eyes swollen. Both eyes protruded, the right more than the left. The right was found totally blind when opened. The ophthalmoscope, about seven weeks after beginning of the erysipelas, showed the media clear, the right optic disc atrophic, one artery and one vein normal, the others thin, with broad white seams or uniformly white. (See fig. 51 in "Hand-Atlas," or plate xvi in "Beitræge," 2d ed.)

Jaeger's Second Case (11).—A. S., peasant woman, æt. twenty-eight. In February exposure (scrubbing of floor, perspiration, rapid cooling). Next morning hardness of hearing, tinnitus, stiffness and pain in neck, coryza with swelling and excoriation of right wing of nose, swelling of lids, and protrusion of both eyes. Next day, the left eye normal; the right twice as much swollen and protruded; pain in right side of head, and insensibility of inner part of right brow, (the latter lasting two months). The fifth day, on awakening in the morning, she noticed that the right eye was completely blind. Ophthalmoscopic examination five months later: Media clear; optic disc vertically oblong, flat, white. One vein of normal calibre; all other vessels thinned, a small central red thread hemmed in by white seams; many converted into uniform white lines. Some accumulation of pigment. Diagnosis: Atrophy of optic disc and retina, thickening of the walls of the retinal vessels.

These descriptions and ophthalmoscopic pictures harmonize with the descriptions of the confirmed condition—the ultimate stage—of almost every other case, our own included, though the fortunate opportunity of having watched the process from beginning to end must lead us to differ, in a great measure, from Jaeger's mode of explanation. While

the white seams at some blood-vessels may be regarded as the result of an inflammatory thickening of the walls of the vessels,—perivasculitis, or rather vasculitis,—the conversion of sharply cut-off segments or of the whole vascular tube into white lines has to be regarded as the organization of thrombi and subsequent shrinkage, as we shall see hereafter. The picture of the second case, plate 35, large atlas, is particularly instructive, and gives a brilliant testimony of Jaeger's accuracy of observation. Though the human understanding will penetrate more and more deeply into nature's working, and opinions will change as years roll on, the faithful portraits in Jaeger's great work will preserve their fundamental importance so long as devotees to ophthalmic science will scan with Helmholtz's immortal instrument the interior of the most wonderful organ in the animal kingdom.

Orbital cellulitis and impairment of vision appear in most cases during the inflammatory stage of erysipelas; in a certain number, however, they appear in the *stage of convalescence.*

Examples of this **post-erysipelatous blindness** are the following:

Parinaud's first case (23).—In ten days the erysipelas was cured. On the eleventh, intense headache on the left side. Temp. 39.3° without relapse of erysipelas. Three days later impairment of sight in the left, and, in a few days, also in the right eye. From the nineteenth day after the onset of the erysipelas perception of light lost in both eyes for two days, then gradual recovery. In six weeks, S was $\frac{1}{4}$ in each eye, and it has remained so with a slightly contracted visual field and a central scotoma. The ophthalmoscopic examination, made six weeks after the inception of the erysipelas, discovered "marked atrophy of the optic discs, the lamina cribrosa very distinct, the calibre of the vessels not materially different from the physiological condition."

Of his second case **Parinaud** (24) says:

Immediately after an erysipelas which had invaded the whole head, the patient noticed a failure of sight in both eyes, which developed rapidly, and has persisted. She counts fingers with each eye at a distance of 20 *cm.* ($\frac{8}{}$'). The optic discs are atrophic. The vessels present nothing particular.

In the first case Parinaud mentions that during the erysipelas which was well marked and extensive, the lids were swollen, but the patient could always open her eyes, see well, and noticed nothing abnormal in her sight.

Vossius (30) reports an interesting case: Angina, followed on the fifth day by severe erysipelas of face and scalp. Delirium and loss of consciousness nine days; then drowsiness. Recovery with normal sensorium in three weeks, leaving general weakness. Three days later, intense frontal headache which, in four days, was followed by obscuration of left eye. Two days later, Prof. **J. Jacobson** (Königsberg) found in the left eye S = $\frac{1}{10}$, Fn, color-perception good. No external abnormity. The *od. and its vicinity are reddish and cloudy, the arteries small, the veins large.* Sensation of unpleasant tension in moving the eye; some tenderness on pressing the globe backward. No exophthalmus. The next day the same objective symptoms, with considerable impairment of sight, were noticed in the right eye. A few days later the eyes began to improve, and in three weeks they were functionally and ophthalmoscopically normal again. When last seen, eight months later, normal condition unchanged.

The pathogenesis of the optic-nerve disease in these cases is, according to the authors, difficult to understand. Vossius and Jacobson speak of two possibilities: 1, a retro-bulbar inflammation limited to the vicinity of the optic nerve; 2, a meningitic process. They add, however, that the exact seat of the lesion could not be determined. I am inclined to diagnosticate in this case a low degree of orbital cellulitis, and retinal exudation from pressure on the central vessels of the retina. The low degree of development admitted of perfect recovery of sight.

Parinaud thinks that, in his first case, he could eliminate the presence of an inflammation preceding the atrophy of the disc, because no traces of a previous exudation were discernible. He says "the visual disturbances which follow facial erysipelas, are accompanied or followed by an *atrophic degeneration of the papilla.* Optic neuritis has been mentioned in no case." This statement rests on statistics of eight cases which he had been able to compile. All these cases, however, had come under the observation of an oculist only when the atrophy was confirmed. He

says, further, that in the cases where one eye alone is affected the lesion must be peripheric, where both eyes are affected it must be central.

Instead of criticizing these views, let us proceed by taking up new material of direct observation, new facts. The pathogenesis will best be derived from the description of fatal cases and autopsies. I will, therefore, give abstracts of three of them which are particularly instructive.

Case of Panas (17).—Spontaneous erysipelas of the face, May 6, '73, in a man æt. twenty-one. May 15th, he enters the service of Prof. Panas with all the signs of a phlegmon of the left orbit. Exophthalmus. Cornea ulcerous from exposure. Mobility of globe reduced. Pupil dilated. Sight greatly impaired. With the ophthalmoscope the od. is found white, the retinal arteries almost absent, the veins congested and tortuous.

June 15th.—Incision at inner angle liberates a teaspoonful of consistent pus.

June 25th.—Earache, rupture of left drum-head; otorrhœa since.

July 6th.—Cries and epileptiform attack in the night.

July 12th.—Swelling in left temple. No exophthalmus, corneal ulcer cicatrized, but vision, which had become weaker from day to day, totally lost.

Sept. 25th.—Deep-seated fluctuation at the temple.

Oct. 5th.—Incision down to bone evacuates a teaspoonful of pus. The probe penetrates in two places through the temporal bone into the skull without giving exit to pus.

Oct. 8th.—New erysipelas; cured on Oct. 25th.

Oct. 26th.—Fever without assignable cause, epileptiform attack. For some days the fever continues; intense headache, cries, coma. Death, Oct. 31st. Duration of disease, six months.

Autopsy.—*Nov. 2d.*—The left middle lobe of the brain is nothing but a purulent pulp. The insular convolution, the optic thalamus, and the corpus striatum were not notably affected. Pia mater in the middle fossa infiltrated with pus; dura intact. Caries and perforation of the squama of the temporal bone. Corrosion and perforation at the petro-squamous suture, through which pus had entered the tympanic cavity and escaped through the ear. General suppurative basilar meningitis the cause of death.

The **eyeball** without and within free from macroscopic alterations. *All the tissues behind the globe were discolored, lardaceous, and fused together.* The optic nerve had to be carved out. The ophthalmic artery and vein, though thinned, were pervious, as well as the cavernous sinus. The optic nerve was not reduced in size. It was dull white, bloodless, harder than normal. The nerve fibres, with the exception of a single tract in the centre, were replaced by a gray hyaline substance, proliferating connective tissue. The central artery of the retina had disappeared without a trace. The nerve-substance diminished gradually from the optic foramen toward the scleral aperture, where it had disappeared entirely.

"To resume, we had to deal with a replacing of the nerve-substance by connective tissue consequent upon a neuritis, but not with an absorption of all the elements of the nerve so frequently seen as the effect of compression."

The **case of Leber** (25) is no less important.

C. T., æt. twenty-five, June 3d, erysipelas on left side of face, with headache, fever, loss of appetite, constipation.

June 5th.—Pain in eye, temple, and forehead on left side. The next day, lids swollen, chemosis, sanguinolent discharge. Pupil narrow, irresponsive; eye protruded; A $\frac{1}{200}$—. In the afternoon of the fourth day, S = o. Delirium at night. In the morning of fourth day right eye likewise protruded, lids and conjunctiva swollen. Sight fair. Head free. Temp., 39.8°. In the afternoon worse and blind.

Seen by Leber on fourth day.

Left globe protruded, immovable; cornea hazy; pupil narrow, immovable; fundus can not be well illuminated.

Right eye: Swelling of lids and exophthalmus moderate; pale-yellow chemosis; globe immovable; pupil narrow, irresponsive; *od. normal; retinal arteries somewhat narrow; veins fairly healthy, but varying in calibre.*

S = o in both eyes.

Stupor. Temp., 40°. Coma. Death on sixth day.

Autopsy by Prof. Orth: In *orbital tissue diffuse purulent infiltration and numerous small abscesses* the size of a pin-head; the same in the ocular muscles. In the *orbital veins numerous purulent patches.* Both globes show no macroscopic changes. Choroid, retina, and vitreous quite healthy.

Purulent thrombosis of cavernous and inferior petrosal sinuses. Fibrino-purulent pachymeningitis. In pons some foci of soften-

ing. In lungs multiple embolic purulent infarctions. Old insufficiency of the aortic valves. Recent mitral endocarditis.

Poland's Case (3) is likewise very interesting:

A stout, middle-aged woman, erysipelas of head and face, successfully combated with antiphlogistic treatment. Very weak. Small abscesses of forehead immediately after; opened. In two days R. eye protruded, immovable; cornea hazy, pupil fixed. S = o. Left eye the same condition, less advanced. Incision, but no pus. Cerebral symptoms; prostration. Death on sixth day.

Autopsy.—Rapid decomposition. "Both orbits infiltrated with sero-semipurulent matter. No attempt was made to form pure pus. There was a general soaking of all tissues with ill-conditioned exudation. Both ophthalmic veins filled with dirty pus. The cavernous sinuses distended with pus."

These histories very graphically describe the course and pathology of the disease. Let us now consider a last group of cases, those in which **the intra-ocular changes have been studied with the ophthalmoscope in earlier stages of the affection,** without which observation its clinical history would be incomplete.

In Vossius-Jacobson's case a moderate degree of neuro-retinitis was noticed, as stated above.

Lubinski's Case (20) is as follows:

Mr. B., æt. fifty-four, hotel cook, suffered from erysipelas of the face and other parts. Eyelids swollen, eyes protruding, stiff, the left more than the right. In several weeks, when he was able to open his eyes again, he was totally blind in both eyes, and Dr. Lubinski found in the right the atrophic stage of neuro-retinitis, in the right the "*most distinct picture of acute neuro-retinitis,*" which gradually passed into that of atrophy by way of the so-called *perivasculitis* retinæ, *i. e.*, gradual appearance of white streaks along the vessels, contraction and ultimately *abolition of the calibre of the vessels in some places,* especially in the finer ramifications.

Patient died of tuberculosis nine months later. Eyes not examined.

Dr. Hy. W. Williams (31–34) communicates four cases: In the *third* the "optic nerve of the (right) blind eye seemed

slightly altered, the retinal vessels lessened in size," about three weeks after the inception of erysipelas.

In the *first*,—erysipelas two weeks; during recovery, sudden swelling of lids, stiffness and protrusion of globe. Sudden amaurosis. OS the next day: "a faint yellowish gray aspect of the whole fundus, as from a slight infiltration, without turgescence or other change of disc, and a little diminution of the calibre of the vessels." Pus was let out by incisions in lower lid. "The grayish-yellow aspect of the fundus disappeared, and the only noticeable ultimate changes consisted in a diminished size of the retinal vessels, without the marked blanched and shrunken aspect of the optic disc, which is visible in ordinary instances of atrophy of the nerve." Loss of vision remained complete.

In the **Case of E. Nettleship** (28):
in which the erysipelas had been preceded by coryza for two months, there were protrusion and immobility of right globe. In two weeks the upper lid "broke," and a "slough" came out. When seen, four weeks after beginning of erysipelas, the optic disc was very pale, the arteries were very small, the veins diminished. Arteries pulsated on pressure. S =o. Other eye normal.

The three following cases, especially the last, have many features in common with our own.

Benson's Case (21) is quite interesting:
Facial erysipelas. Right eye closed for a month; when opened, totally blind. Od very pale. Arteries very small, some completely empty of blood, appearing as white lines. In the region of the macula, *pigment spots, probably due to hemorrhages.*

Dr. Coggin's Case[1] (22) is very instructive:
Mr. B., æt. sixty-four, facial erysipelas. General symptoms mild. Skin of half the upper lids sloughed. On the subsidence of the infiltration, when he could raise his lids, found that he was blind. On sixteenth day, when first seen by Dr. Coggin, "the cornea so denuded of epithelium as to render futile the use of the ophthalmoscope." Three weeks later immobility and protrusion of eyes diminished, cornea sufficiently clear to allow a fair view of the fundus. Lenses and vitreous normal. "The retinal *vessels* of the right eye were *empty*, and presented a striking arborated appearance. The *vessels* in the left eye were also *bloodless*, save

[1] Dr. Coggin's publication, which had escaped my literary search, was pointed out to me by Dr. E. G. Loring, in the discussion at the N. Y. County Med. Soc.

the one passing upward, which divided into two branches just beyond the disc-border, and contained blood so far toward the periphery as I was able to follow, while a second vessel, issuing from the disc beneath and to the right of the first, became abruptly anæmic on reaching the papillary margin. I was unable to determine whether these vessels were arteries or veins." Discs grayish-white, devoid of small vessels. In neither eye was there observed the cherry spot met with in recent cases of embolism. Three months after the onset of the erysipelas, "the ophthalmoscope revealed no further changes, save that the empty vessels were less readily seen in their entire course as they had dwindled away in some places, while in others they gave a glistening white reflex. In the left eye the vessels containing blood looked as they did when first seen." Blindness absolute.

The author, who published his case under the heading, "Ischæmia of the Retinal Vessels," gives, so far as it interests us here, the following comment: "It is probable that this case was not one of embolism, but rather of thrombosis. It is likely that the ischæmia resulted from the propagation of the erysipelatous inflammation beneath the capsule to the optic nerve, upon which it exercised enough pressure to retard the circulation of the blood in the retinal vessels, and thus occasion thrombus; or it may have been caused, again, by thrombosis due to the extension of the inflammatory process to the vessels themselves."

The last case which I have to cite is ophthalmoscopically the most interesting of all that are on record thus far. It occurred in the practice of Dr. **Baumeister,** of Berlin, and is reported by Dr. **J. Hoesch** (29).

Mrs. —, æt. 41, in eighth month of pregnancy, erysipelas of left side of face. When on its decline, rapid swelling of lids, chemosis, protrusion, and immobility of globe. S = 0. No ophthalmoscopic enamination practicable when first seen. Below outer commissure fluctuating elevation, incision, evacuation of some pus. Gradual improvement; ten days later with the ophthalmoscope a gray reflex from fundus, no details recognizable. Some days later: In front of optic disc a diffuse gray opacity covering disc and vicinity (author thinks it was an opacity in the vitreous), beyond it the peripheric terminations of the retinal vessels filled with dark, almost black blood. The opacity dis-

appeared gradually, and the whole fundus became clearly visible; od. whitish; arteries thread-like, empty; veins enlarged, dark, surrounded by white seams. Gradually the column of dark blood in the veins appeared interrupted in many places by white, bloodless segments, the same size as the dilated veins, or even larger. The red coloration of the remaining portions disappeared one after the other, leaving ultimately nothing but white vessels, shrunken in most places, defective in many, dilated in some (by hypertrophy, as the author supposes). Two simple drawings—the one from the fourth and the other from the fifth month—represent the conditions very strikingly as white lines on a black background.

From the preceding remarks it follows that our knowledge of the *early* intra-ocular changes which complicate orbital cellulitis in facial erysipelas and mostly lead to blindness, are still insufficient. Through the kindness of two of my medical friends I had the rare opportunity of observing with the ophthalmoscope, from the onset of the disease, as I have already stated, a very marked case, which exhibited changes not yet described, so far as I am aware.

The case **H. Knapp,** (35) is as follows:

March 29, 1883.—Drs. Gulecke and Schottky called me in consultation on the ocular affection of a man (E. T. F.) of about 40 years of age. Dr. Schottky was kind enough to give me the following notes of the previous clinical history. "The patient has suffered repeatedly from the effects of syphilis; he has had in particular tertiary manifestations in the lower jaw, hard palate, and vomer. He lived in the tropics and came to New York in the middle of March, 1883. The weather was very inclement. He contracted a cold soon after his arrival, as he did almost regularly whenever he travelled north.

March 20th.—Erysipelas of the nose, rapidly extending to the pharynx.

March 21st.—Erysipelas spread over nose, cheek, eyes, and forehead. Naso-pharyngeal mucous membrane very red. Sensorium free. Temperature, 104° F.; pulse, 120–130. Diarrhœa. Quinine. Painting of the marginal zone with a ten-per-cent. alcoholic solution of salicylic acid, the interior of the nose with a two-per-cent. solution of carbolic acid in glycerine.

March 22d.—Erysipelas over forehead, both ears, and both

sides of the neck. Temperature, 104.8°; pulse, 125. Quinine, 1.00 morning and evening.

March 23d.—No further advance of the erysipelas. Pulse, 125; temperature 103°; quinine 1.00 daily.

March 24th.—Temperature, 100.°

March 25th.—Feels comfortable. 11 A.M., pulse and temperature normal. Eyes redder and more swollen than yesterday, Chemosis. The right eyeball displaced down and forward, and the patient says that he does not see so well with this eye as before. The left eye affected in the same manner, but in a less degree. No pain.

March 26th.—General condition excellent; that of eyes alarming. Lids tight, rigid, swollen, dark-red; both globes protruded. the (right) partially uncovered. Marked chemosis; both corneæ clear. Slight mobility of the left pupil, which was myotic. After a consultation with Dr. J. Simrock, incisions were made with a narrow-bladed knife from 2 to 2½ inches deep into the upper and lower parts of the right orbit, and into the upper part of the left. In the upper part the tissue was rigid; in the lower, somewhat softer. Only blood came out. Borated dressing, kept moist.

March 27th.—General condition good. No perception of light. At times photopsiæ.

March 28th.—Incision in lower part of left orbit. No pus. S = o."

March 29th.—I examined the patient in consultation with Drs. Gulecke and Schottky in the afternoon, and found the following condition: Great swelling and congestion of the lids; chemosis. Superficial ulcers in lower part of right cornea from insufficient closure of the lids. In left eye the cornea clear; pupil medium; chemosis. Eyeballs protruded, immovable, of normal tension and sensibility. S = o, both sides.

Ophthalmoscopic appearance of left eye. (See colored plate A, fig. 1.) Media clear. The posterior part of the fundus white like milk, the peripheral part reddish-white. Optic disc and yellow spot not recognizable. A great many very dark-red, almost black bloodvessels radiate from a common centre, the invisible optic disc, in every direction. They are very tortuous; all of them have the same color; the larger ones have twice, and in some places three times the calibre of the largest normal retinal veins. At the optic disc they all are thin, tapering, and disappear from view before reaching the centre of the disc. Some present

varicose dilatations in their course. Toward the periphery they are less thick and less black. They cross one another in no place, show no change by pressure upon the eyeball, and may all fairly be considered as *veins engorged with stagnant blood.* Between and in part upon them there are a great number of dark-red, yet not black-red, extravasations of blood, which, like retinal hemorrhages in general, are streaky in the vicinity of the optic disc, and roundish toward the equator and at the periphery of the eye. The position of the macula lutea can be determined by the course of the bloodvessels, but is not distinguished by the red spot which is almost always present in cases of embolism of the central retinal artery.

The ophthalmoscopic picture in the right eye is, on account of the corneal opacity, less clear than in the left, yet sufficiently distinct to recognize the condition to be essentially the same as in the right eye. This similarity having continued during the whole course of the disease, my further description will have reference to the left eye alone.

The condition of the eyes was regarded as the result of a compression of the orbital blood-vessels, with suspension of the retinal circulation. The *prognosis quoad restitutionem visus* was considered as hopeless, *quoad vitam* as favorable, because there were no cerebral symptoms indicating the extension of the morbid changes of the orbit into the cranial cavity; moreover, because a beginning wrinkling of the eyelids, the absence of fever, and the satisfactory general condition of the patient made it evident that the constitutional disease had reached the stage of convalescence. In consideration of these facts we thought that symptomatic, chiefly roborant, treatment alone was called for. Our supposition proving correct, I can confine my further remarks to the description of the course of the ocular affection, especially the changes that took place in the ophthalmoscopic picture.

Two days later, *March 21st*, I found the swelling of the lids and conjunctiva reduced, the right cornea more opaque, the cornea and refractive media of the left eye clear. The ophthalmoscopic picture (see figure 2, plate A) had undergone essential alterations. The fundus was less white, and at the periphery the usual red

coloration came again clearly to view. Numerous black, tortuous, dilated, and, in places, varicose vessels radiated from the centre in every direction as at the first examination. From the same centre, however, a number of light-red, straight, evidently arterial vessels, branched between the dark vessels, and here and there crossed them. They had from one to two thirds the size of normal arteries, disappeared when the eyeball was pressed upon, but could not be made to pulsate visibly. The old dark-red hemorrhages were unchanged, but between them a smaller number of light-red, new ones had made their appearance. They were likewise streaky in the vicinity of the optic nerve and roundish farther away, but extended less toward the periphery than the others, their region being the neighborhood of the od. and yellow spot. (In the drawing, fig. 2, plate A, the distinction between the two sets of hemorrhages is not sufficiently marked, and the large veins in figs. 1 and 2 should be still larger.)

Beyond the equator the veins lost their black color, became dark-red, and were not easily distinguished from the arteries, which, however, could not be followed to the periphery. In the peripheric zone there were no hemorrhages.

Both eyeballs moved a little.

Two days later, *April 2d*, the mobility of both globes has returned in every direction, but is still limited. The optic discs are recognizable, the milky opacity of the background less intense. Vessels and hemorrhages unchanged.

April 24th.—In the left eye the optic disc distinctly recognizable, uniformly whitish ; two thin, light-red vessels, main branches of the central artery, originate in the centre of the disc and run the one upward, the other downward. On the right optic disc some veins are also observable. The tension of both globes normal or slightly diminished (— T ?).

April 6th.—No material change.

April 9th.—Some vessels on the optic disc and its vicinity appear as white stripes with a central, thin, red thread, which broadens toward the periphery, whereas the white seams gradually diminish and disappear.

April 18th.—The course of a number of veins and also of some arteries was interrupted by sharply defined segments of the same calibre as the vessels. (White thrombi.)

April 22d.—These changes were so far advanced, and presented so peculiar a picture, up to that time unknown to me, that I made,

in my ophthalmoscope room, an exact drawing of it, which is rendered in fig. 3, plate B. I may premise that the patient had so far recovered that he could go out. The swelling of the lens and the protrusion of the eye had disappeared ; the eyeballs moved freely; the pupils were of medium size, immovable; the vision totally lost. The centre of the background was still covered by a whitish veil, which was densest and somewhat speckled in the region of the yellow spot. The optic disc was snow-white. Numerous thin arteries and dark-red veins branched over the background. The hemorrhages were fewer in number, all of them brown-red, and situated chiefly near larger, dilated, and tortuous venous trunks. As formerly they had been more numerous in the neighborhood of the optic nerve, but now were located at some distance from it, it was evident that the greater part of the former hemorrhages had been absorbed and new venous extravasations had occurred. The calibre of most of the vessels, arteries as well as veins was interrupted by sharply cut off, snow-white, longer or shorter intercalary portions of the same thickness as the adjacent columns of blood on either side. The intercalary portions were entirely different from the picture of perivasculitis, which, in the first segments of some retinal vessels, was also present in our case (omitted in fig. 3, but marked in fig. 4). In some places, especially in the arteries, the intercalary portions were not pure-white, but yellowish-white. Further observation, however, showed that later they also became pure-white. The veins still presented numerous dark-red, dilated portions ; some showed in shorter or longer distances dark and bead-like enlargements (resembling a rosary), in which neither spontaneously nor by pressure upon the globe could any motion be recognized. In the region of the yellow spot there were many hemorrhages, and the white discoloration of the fundus was most pronounced ; the yellow spot, however, not recognizable. The changes which from now were noticed in the background, consisted in gradual absorption of the hemorrhages, clearing up of the white discoloration of the retina, increase of the white intercalary portions both in extent and number, so that ultimately the vessels, with a few exceptions, were totally transformed into white cords. The last drawing (fig. 4, plate B) was made June 8, 1883, three months after the onset of the disease. The background had its normal red color, only the region of the yellow spot was still covered with a slight white veil. The papilla was white as snow. The beginnings of the blood-vessels could be distinctly seen on it as white or red

lines. The majority of the vessels were converted into white cords in their whole course, sharply outlined, and terminating abruptly. Two principal vessels, an artery and a vein, still contained blood from their origin to the periphery, where they disappeared from view. Another contained blood in its first portion, but was in its further course likewise filled with white contents. A fourth one contained dark blood in a portion between its central and peripheric parts. All other vessels were converted into shining white lines. Two of the blood-containing vessels had white seams (perivasculitis). The drawing was particularly remarkable in the region of the yellow spot, toward which, from both the arteries and the veins, numerous white lines ran, more or less parallel, toward the centre, without reaching it. In this place the retina was still opaque, whereas everywhere else the background had regained its normal appearance.

S = o, in both.

In trying to explain the phenomena of the disease of which I have cited a number of representative cases, I venture to make the following

Remarks:

Erysipelas, now generally considered to be produced by infection of a wound in the skin or mucous membrane, shows pathologically dilatation and engorgement of the blood vessels, serous and purulent infiltration of the skin and subcutaneous tissue, in which of late bacteria have been found, which could be successfully inoculated (Tillmanns and others).

The purulent infiltration is in small patches, which may be absorbed or coalesce and perforate the integument.

The infiltration acts in two ways:

1. By compression.

2. By exciting inflammation: neuritis, neuro-retinitis, thrombo-phlebitis, meningo-encephalitis (see the cases of Panas, Leber, Poland, Schüle, and others).

The phenomena of compression are very marked in orbital cellulitis, and without any phlogogenic action of the exudation, the ophthalmoscopic changes, in our case at least, could be satisfactorily explained.

When the infiltration of the cellular tissue of the orbit

reaches a certain height, the central retinal vessels are compressed. We may presume that the vein is compressed sooner and in a higher degree than the artery. This must lead to its dilatation, to retardation and, ultimately, to stoppage of the current of blood, diapedesis of the blood corpuscles, and rupture of the capillaries and smaller veins. This explanation is supported by the engorgement of the veins and the smallness of the arteries mentioned in every case. When the infiltration of the orbital cellular tissue diminishes, the pressure on the artery will likewise diminish, blood will again be thrown into the retina, and as the veins are still filled and compressed, new hemorrhages will occur by diapedesis, or rupture of the vascular walls. This condition was well illustrated (fig. 1 and 2, plate A) in our own case, in which on the second day the arteries were completely invisible, which means that they were empty, for with the ophthalmoscope we see only the column of blood, the walls of healthy retinal vessels being transparent. On the fourth day the arteries were seen again, together with numerous new hemorrhages, distinguished from the older by their bright color.

The stagnant blood coagulates only when the vascular endothelium becomes diseased and defective, and then also the organization of the thrombus begins. This organization of the thrombus is nothing but an excrescence of connective tissue, arising from the walls of the vessels, into the thrombus, in the same way as any porous substance—for instance, a sponge—is pervaded by connective-tissue excrescences sprouting from an ulcer. The coagulated blood itself does not organize, but is absorbed or changed. This process takes place in isolated segments, which extend, coalesce, and ultimately fill the whole vessel. Subsequently the new-formed connective tissue may shrink, the vessels appear threadlike and become totally invisible. This was the condition reached in our and, I conjecture, in all surviving cases, where sight was totally destroyed. Symptoms of inflammation, milky opacity of the retina, may accompany this process.

In a number of cases, Vossius-Jacobson, Lubinski, Hy

W. Williams, neuro-retinitis and perivasculitis are mentioned. In the majority, however, inflammation, was absent; and where it is mentioned, it was transient.

Further observation is needed to clear up this point.

If I may be permitted to draw general conclusions from the observation of my own case—the completeness of which may let the endeavor appear not too presumptuous—I would explain the intra-ocular changes and the impairment of vision as the result of compression of the central vessels of the retina in the orbit. In no other case has the first stage, total compression of the artery, been directly observed with the ophthalmoscope. That normal vessels in which the circulation is acutely interrupted are invisible, can be seen at any time while the globe is pressed upon; it is, moreover, demonstrated by the sudden or almost sudden blindness from quinine poisoning, where the optic nerve and retina, as far as the vessels are concerned, are a blank, in some cases no trace of vessels being perceptible in the first stage. The sudden or rapid occurrence of blindness mentioned in many cases, is easily understood on this supposition. When the compression is incomplete, the arteries are seen small, the veins large.

Retardation of circulation and venous stasis lead to œdema and exudation—milky opacity—of the retina.

It is remarkable that hemorrhages have in no case except ours been directly observed. Their occurrence is supposed by Jäger and others from the presence of pigment in the later stages. If the compression is incomplete, if the artery alone is compressed, or if the artery and vein are compressed at the same time, hemorrhage need not occur. In embolism of the central retinal artery hemorrhages are rare and insignificant; in embolism of a branch of the retinal artery, they may be very extensive. In thrombosis they may be present (J. Michel: *Gr. Arch.*, vol. xxiv., p. 37), or absent, (Angelucci: *Zeh. Klin. Mon.*, 1878, p. 443). The retardation of the current and the stagnation of blood in the vessels may cause inflammation of the vascular walls—perivasculitis, arteritis, phlebitis—leading to the formation and organization of thrombi. That in our case and some others, the

conversion of the vessels into white cords was not the result of an inflammatory thickening of the coats of the vessels, but an organization of thrombi, is evident from the sharply defined white segments, having the same thickness as the neighboring portions, which were filled with dark blood and free from white seams.

Apart from this purely mechanical explanation, which I have advanced on account of its simplicity, we must not forget to bear in mind the importance of thrombo-phlebitis and purulent inflammation of the orbital tissue, with its extension to the brain. That the morbid processes in erysipelas are caused and modified by the presence of micro-organisms appears beyond a doubt, though not yet frequently enough demonstrated.

The **prognosis** as to **life** and **sight** is quite uncertain. Of the thirty-five cases compiled in the subjoined bibliography we find:

Death, when one eye only was affected, in . .	4 cases
" " both eyes were affected, in . . .	6 "
Recovery in	25 "
Of these, one eye only affected and permanently **blind** in	12 "
Both eyes affected and permanently **blind** (cases: Arlt, Labinski, Coggin, Knapp), in	4 "
Both eyes affected; sight restored in one, in the other lost in	3 "
Both eyes temporarily blind; restoration of sight incomplete in both, in	3 "
One eye affected, amblyopic but not blind; restoration of sight complete, in	1 case.
Both eyes affected, amblyopic; restoration of sight complete, in	2 cases.

The mortality, twenty-nine per cent., in cases of orbital cellulitis from erysipelas, is very great.

Of the surviving cases, blindness in both eyes occurred, in	16 %
Of the surviving cases, blindness in one eye occurred in	60 %

Incomplete recovery of sight occurred in . . . 12 %
Complete recovery of sight occurred in . . . 12 %

In the last category sight had not been totally lost during erysipelas; in the last category but one it was completely lost for a time.

These numbers have only an approximate value, as they may be greatly changed by larger statistics. With regard to the restoration of sight there are several statements which could not be used in the above bibliography, as there were no histories given, or the publications were not at hand. Von Graefe, for instance, says in a very important paper[1]: "I have seen restoration of sight after erysipelas in two cases." Theo. Leber has the following passage[2]: "Fronmüller and Schmelcher state (M. Schmelcher: Amblyopie in Folge von Gesichtsrothlauf, *Inaug.-Diss.*, Erlangen, 30 S.) that in erysipelas they have not infrequently seen temporary impairment of vision, from slight amblyopia to total loss of sight, with dilatation and sluggishness of the pupil, which disappeared rapidly as soon as the swelling of the lids subsided." This possibility, which has to be borne in mind in framing the prognosis, is exemplified also by a number of cases in which orbital tumors produced exophthalmus,—for instance, the important case of vascular protrusion of both eyeballs which Dr. E. Grüning published in the fifth vol. of these ARCHIVES. There were in both eyes choked discs, the arteries were filiform, the veins large and tortuous, accompanied by retinal hemorrhages. The total blindness, which had existed three weeks, disappeared at once when the left common carotid was tied. Yet this favorable occurrence, in blindness from erysipelas, is noted rather seldom.

I abstain from going into further details, also from discussing the **treatment** of erysipelatous exophthalmus, saying only, that early and deep incisions into the orbital cellular tissue and strengthening internal medication are generally recommended.

[1] Über Neuro-retinitis u. gewisse Fälle fulminirender Erblindung. His ARCH., 1866, p. 149.

[2] "Graefe-Sämisch's Cyclopedia," vol. v., p. 804.

BIBLIOGRAPHY.

It has not been my intention, in the present paper, to consider all points that may be brought in connection with the occurrence of blindness from erysipelas, but to cite only so much from literature as will enable the reader to form independent opinions on the different points here in question. To facilitate further and more extensive studies, I append bibliographical notes on the subject so far as I have been able to collect them.

1. J. B. v. LAMZWEERDE, 1656; *Appendix Armamentarii chirurg.* Joh. Sculteti. Amstelod. 1741. Quoted by Leber. Erysip. faciei et palpebr. gangren. Exophthalm. **One** eye. **Recovery. Preservation of sight.**

2. DEMARQUAI. *Tumeurs de l' orbite*, 1860. A case of Piorry. *Clinique médicale*, p. 381, 1833. Quoted by Leber. **Death** on fifth day from fever and pneumonia. Small disseminate collections of pus in right orbit only. Cranial cavity healthy.

3. POLAND. *Lond. Ophthal. Hosp. Rep.*, vol. 1, p. 26, 1857. (Mentioned in text p.) **Both orbits,** ophthalm. veins and cavernous sinus filled with pus. **Death.**

4. B. COHN. *Klinik der embolischen Gefæskrankheiten*, p. 196. 1860. **Protrusion of both eyes. Death.** Purulent phlebitis of orbit and brain. Lungs, metastatic inflammation. Embolism.

5. H. WEBER. *Cases of cerebral affection caused by disease in the nose and eyes. Med.-Chirurg. Transact.* xliii., case 1, p. 177. 1860. **Right** eye only affected. **Death.** Thrombosis of ven. ophth. and sinus cavernosus. Meningitis.

6. SCHNELLER. Beiträge zur Kenntniss der ophthalmoscopischen Befunde bei extraoculären Amblyopien u. Amaurosen. *Gr. Arch.*, vii., 1, p. 70, 1860. **Right** eye only. S — 0. Arteries narrow, veins less narrow, slight diffuse opacity of retina. Incipient atrophy of od. **Recovery.**

7. TETZER. Exophthalmus durch Orbitalabscess. *Bericht über die Arlt'sche Augenklinik*, p. 116. 1867. Orbital cellulitis **left** side only. **Phthisis bulbi. Recovery** of general health.

8. BIERMANN. *Zeh. Klin. Mon.* 1869. p. 91. Erys. gangr. **Right** eye protruded, immovable, cornea hazy, insensible; reddish-yellow reflex from background. Orbital abscess. **Panophthalmitis.** Phthisis bulbi. **Recovery.**

9. F. ARLT. *Ibidem.* **Both** eyes, erys. gangr., orbital cellulitis, atrophy of opt. nerves. S — 0. Preservation of globes. **Recovery.** Arlt has seen several similar cases.

10. E. JAEGER. *Handatlas*, 1869, fig. 51, text p. 71. The same enlarged in *Beiträge zur Pathologie des Auges* (large atlas), first edition, plate 36; second edition, plate 16. **Both** eyes affected. **Restoration of sight in left,** blindness in right, **Recovery.**

11. IDEM. Handatlas, fig. 75, text page 124. Large atlas, first edition,

plate 48 ; second edition, plate 35. **Both** eyes affected, sight restored in left, **destroyed** in right. **Recovery.**

12. H. PAGENSTECHER. Atrophia nervi optici nach Erysip. faciei. *Zeh. Klin. Mon.* 1870. P. 207 and *Lond. Ophthal. Hosp. Rep.*, vii., p. 32, 1871. **Left** eye only. Absolute **amaurosis. Recovery.**

13. IDEM. *Ibidem*, **both** eyes. **Recovery.**. S = $\frac{1}{8}$ each.

14. SICHEL. Phlegmon de l' orbite. *Arch. génér.* 1870. p. 458. Quoted by Leber and Schwendt. Protrusion of **both** eyes. **Death.** Purulent cellulitis of orbit. Pus in sinus cavern. and middle cerebral fossa.

15. J. HUTCHINSON. *Lond. Ophth. Hosp. Rep.*. vii., p. 35, 1871. This paper, p. 85. **Recovery. Both** eyes affected ; sight restored in left, **lost** in right.

16. WARLOMONT. *Annal. d' ocul*, vol. lxvi. 1871. Schwendt, p. 32 Furuncle above root of nose. Erysipelas and protrusion of **both** eyes. **Death** by thrombo-phlebitis.

17. PANAS. *Gazette des hôp.*, 13 Déc., 1873. Quoted by Leber and Schwendt. Our text p. 89. **Left** eye only affected. **Death.** Orbital cellulitis and meningo-encephalitis purulenta. Ophthalmic art. and vein, and cavernous. sinus pervious.

18. HY. D. NOYES. Cases of Disease of the Orbit. *Richm. and Louisv. Med. Jour.*, 1875, p. 658. Quoted by Leber, *l. c.* p. 221, from *Nagel's Jahresb.* **Left** exophth., perforating corneal ulcer, phthisis bulbi. *Death* from bronchitis.

19. H. SCHÜLE. Zur Mycosis des Gehirns. *Virch. Arch.*, lxvii, p. 215. 1876. Quoted by Leber, *l. c.* p. 234. **Both** eyes affected, atrophic. **Death.** Thrombo-phlebitis venæ fossæ Sylvii ; cerebral abscess containing micrococci. Abscesses in lungs and right kidney.

20. LUBINSKI. *Zeh. Klin. Mon.*, 1878. p. 168. Our text p. 91. **Both** eyes blind ; atrophy of odd. Death, nine months later, accidental, from tuberculosis.

21. BENSON. *Brit. Med. Jour.*, March 16, 1878. Abstract by Parinaud. *Arch. gén.*, 1879, p. 648. Text, p. **Right** eye only, blind. Atr. od. **Recovery.**

22. D. COGGIN. Ischæmia of the Retinal Vessels, Following Erysipelas. *Trans. Am. Ophth. Soc.* Vol. ii., p. 570, 1879. Text p. 92. **Both** eyes, blind. **Recovery.**

23. PARINAUD. Atrophie des nerfs optiques dans l'érysipèle de la face. *Arch. génér. de méd.*, Juin, 1879, pp. 641–660. Text p. 87. Case 1. **Both** eyes temporarily blind, regaining S = $\frac{1}{8}$ each. Atr. odd. **Recovery.**

24. IDEM. *Ibidem.* **Both** eyes. **Recovery.** Atr. odd. S = $\frac{1}{100}$ each.

25. DESPAGNET. *Recueil d' ophthalm.*, 1880. Blindness, **one eye. Recovery.**

26. TH. LEBER. Beobachtungen u. Studien über Orbitalabscess u. dessen Zusammenhang mit Erysipel u. Thrombophlebitis. *Gräfe's Arch.*, vol. xxvi., No. 3, 1880, p. 212. Fall (2), p. 224. Text p. 90. **Both** eyes. **Death.** Purulent orbital cellulitis. Purulent thrombosis of cavernous and inferior petrosal sinuses. Meningitis. Purulent infarcts in lungs.

27. SCHIESS, publication by SCHWENDT. *Ueber Orbitalphlegmone*, p. 11, 1882. **Right** eye (only) protruded, immovable, blind. **Recovery.** Od. completely white, retinal vessels very thin.

28. NETTLESHIP. Atrophy of Optic Disc after Phlegmonous Erysipelas of Orbit. *Trans. Ophthal. Soc. of the Un. Kingd.*, vol. ii, p. 90, 1882. Text p. 92. **Right** eye only. Od. atrophic. Arteries and veins small. S = 0. **Recovery.**

29. BAUMEISTER–HOESCH. Über die Erkrankungen der Gefaesswandungen in der Retina, imbesondere in Folge von Erysipelas faciei. *Inaug.-Diss.* By Dr. J. Hoesch. Berlin. J. Dräger, 1882. (Contains nothing new, except the case mentioned in our text p. 93.) **Left** eye only. S = 0. Atr. of odd. and retinal vessels. **Recovery.**

30. JACOBSON–VOSSIUS. **Both eyes.** Neuritis after Erysipelas capitis et faciei. *Zeh. Klin. Mon.*, 1883, p. 294. Text p. 88. S $\frac{1}{100}$; after **recovery,** $\frac{10}{10}$ in each eye.

31. HY. W. WILLIAMS. Orbital Cellulitis as a Sequel of Facial Erysipelas. *Bost. Med. and Surg. Jour.*, Jan. 18, 1883, p. 51. Text p. 91. *Case* 1. **Left** eye only; exophthalmus. Complete amaurosis. **Recovery.**

32. IDEM. *Ibidem. Case* 2. **Both** affected. **Recovery.** S. good.

33. IDEM. *Ibidem. Case* 3. **Right** eye protruded and immovable. Things looked red with this eye. Perfect **restoration** of sight and health.

34. IDEM. *Ibidem. Case* 4. **Right** eye protruded, opt. n. slightly altered; vessels lessened in size. **Recovery,** "but the pressure of the inflamed cellular tissue upon the retinal vessels had **extinguished vision.**"

35. H. KNAPP. Case of Blindness from Retinal Thrombosis in Consequence of Facial Erysipelas. *Trans. Am. Ophthal. Soc.*, vol. iii., p. 573, 1883. Communicated in extenso in this paper p. 94. Both eyes protruded, immovable. Retinal arteries at first bloodless, veins engorged; venous stasis, milky opacity and apoplexies of retina, organization of thrombi in veins and arteries. Atrophy of odd. Permanent and absolute blindness. **Recovery.**

The following case came to my notice when the foregoing paper was in type.

36. HY. G. CORNWELL. Purulent cyclitis from septic embolism of the eye, in a case of phlegmonous erysipelas. *Med. Rec.*, Aug. 12, 1882. Impairment of sight in **right** eye only. Lids swollen, circumcorneal injection, tenderness in ciliary region, no chemosis, cornea and iris clear, hypopyon of 3 *mm.*, vitrous cloudy, fundus not visible. — T_2; counts fingers at five feet, later $S\frac{1}{\infty}$. **Death** on 24th day. "No evidences of orbital cellulitis were at any time present.

INDICATIONS AND CONTRA-INDICATIONS OF JEQUIRITY.

COMMUNICATION TO THE EDITOR OF THE ARCHIVES OF OPHTHALMOLOGY.

BY L. DE WECKER, PARIS.

IT had been my intention not to take part for the present in the discussion on jequirity, fearing my judgment might not seem impartial, especially as I have been frequently accused of too great enthusiasm and irritability in treating this question. Your kind request, however, induces me to inform you of my views on, and experience with, jequirity, as I shall attach the greatest weight to your opinion.

Those of my colleagues who will take the trouble to review the already extensive literature of jequirity, and especially to read the discussion at the late meeting of the French Ophthalmological Society, can readily convince themselves that my enthusiasm is far surpassed by that of others, and if I showed some irritability, I would request you to observe that this was not the case in discussing the

NOTE.—The editor of this periodical, impressed with the great importance of jequirity in ophthalmic practice, asked Dr. de Wecker whether he would not kindly favor the ARCHIVES with a comprehensive statement of his extensive and matured experience with this remedy, in particular its best mode of application, its indications and contra-indications, the precautions to be taken in its use, and its primary and final therapeutical results. When Dr. de Wecker had kindly and promptly sent him the above most valuable communication, he wanted to supplement it by the experience gained with the new remedy in America. His letters, soliciting corresponding contributions from a number of oculists and ophthalmic hospitals in this country, have been most obligingly answered, and he takes great pleasure in laying before the readers of the ARCHIVES these communications as collective evidence of the efficacy of a remedy which, though long popular in Brazil, has only of late been introduced by de Wecker into the medical practice of the world. H. K.

remedial power of jequirity, but only in discussing its physiological action. Here I am quite ready to confess *mea culpa* and acknowledge that I was wrong in allowing myself to be carried away by my temper as I might simply have said to myself that time would soon enough prove the inaccuracy of the observations made at some hospitals, on which was based the assertion that so powerful a remedy as jequirity produced only a slight conjunctival catarrh.

I attach particular importance to informing you of the **best mode of application** according to our experience, **what cases** should be strictly **excluded,** and what are the conditions under which it may be **safely** recommended.

In the first place every one who desires to test this method should either prepare the infusion himself, or entrust its preparation to a reliable assistant. The seeds are first crushed between two stones in order to free them from their husks, and then ground to a fine powder in an ordinary coffee-mill. Cold water is then poured upon the powder and the infusion set aside for three hours, at the expiration of which time it is filtered and ready for immediate use. As the infusion is used daily, it is prepared every day at one o'clock and applied at half-past four or five; it must be slightly opalescent, almost transparent, and must have the odor of fresh herbs. I consider it very important that only fresh infusions should be used in order to obtain uniform results, as they develop an unpleasant odor after even a few days, and the old, although not inefficient, are not so reliable in their action, whilst the odor is disagreeable, both to the patient and the physician. We therefore never employ an infusion prepared the preceding day and wanting the specific odor of jequirity.

The strength of the infusion is three per cent.; only in cases of dry, degenerated conjunctiva is a five-per-cent. infusion used. Coppez employs in every case a ten-per-cent. infusion (in the large ward reserved for cases treated with jequirity). He, like myself, applies the infusion only once, and also thoroughly rubs the inverted lids several times with a sponge dipped into it, and applies the sponge to them for several minutes. The conjunctiva of the globe

should be touched only superficially, unless there be a dense pannus; the cornea should be spared, especially if there are ulcers, but the infusion should be thoroughly applied to the conjunctiva of the lids and the fornix, the latter being exposed by a slight pressure with the lids against the globe.

A slight difference between a three-per-cent. and five-per-cent. infusion is perceptible in the result, though I do not think it is always possible to tell whether a five, eight, or ten-per-cent. infusion has been employed. Sattler has called attention to the fact that the intensity of the inflammation is not proportional to the degree of concentration. But although several applications of weak infusions (one-,two-per-cent.) can be made without danger, the same is not true when stronger ones of five-per-cent. and more are applied. It is advisable, therefore, when employing an infusion of three-per-cent. or more to apply it only once and not repeat it before the lapse of forty-eight hours—*i. e.*, in such cases in which the result of the first application has been insufficient. In the great majority of cases a single application of a three- or five-per-cent. infusion is sufficient to produce a violent jequirity ophthalmia, and if the trachoma is not cured a second and third application is made, but with an interval of at least two or three weeks between them.

The dangers of jequirity ophthalmia are due to two causes: First, application of strong infusions in too rapid succession; and second, application to an eye already discharging. I have now so frequently produced jequirity ophthalmia when the conjunctiva was perfectly normal (for clearing up the cornea) that I do not hesitate to assert that an intense inflammation may be produced by a single application of a three- or five-per-cent. infusion in any eye with intact, healthy conjunctiva, and that the cornea is not endangered in the least in spite of the intense swelling of the lids and the thick and dense membranes which cover the conjunctiva and make eversion of the lids in the beginning almost impossible. But the cornea is no longer safe when a beginning ophthalmia is unduly increased by another application, or when there is already a purulent discharge, because not the specific jequirity ophthalmia is then

produced, but a violent increase of the pre-existent purulent conjunctivitis. I am the first to acknowledge that this not only does not diminish, but on the contrary increases the danger to the cornea, and if therefore v. Hippel (*Arch. f. Ophth.*, vol. i., No. 4, p. 29) says: "It cannot therefore be denied that sometimes the treatment with jequirity is directly injurious," he is quite right; but in a preceding sentence he says: "These without exceptions were cases of trachoma in which thus far the cornea had remained entirely intact"; but trachoma with the cornea intact greatly resembles chronic purulent conjunctivitis with marked papillary hypertrophy, and of such cases I am the first one to assert that the treatment with jequirity is rather injurious than beneficial.

Such cases of chronic purulent ophthalmia were also treated for the sake of experiment, but I always told the students that I thought they would grow worse under this treatment. In such cases I have not only seen corneal ulcers extend, but even develop. It is not the genuine jequirity ophthalmia which is produced but simply an increase of the pre-existent purulent conjunctivitis, as I shall now proceed to show.

It is well known that the jequirity ophthalmia can only be produced with great difficulty and by the observance of special precautions. The reasons for this I have stated elsewhere; they have also been demonstrated histologically by Prof. Cornil (*Semaine méd.*, No. 5, 1884). But with purulent conjunctivitis it is quite different; the infection is easily communicated to the other eye, as I observed but lately, so that I was obliged to cauterize both eyes twice daily.

At the Paris Congress a similar case was discussed when even the protective bandage was recommended, although in the genuine jequirity ophthalmia this is entirely unnecessary. You also write: "Not the usual croupous but genuine blennorrhoic (pyorrhoic) ophthalmia resulted; one eye was touched only three times, the other not at all, the first one infecting it." Without having seen your patient I do not hesitate to assert that this was a case of purulent

conjunctivitis (probably resulting from trachoma), whose intensity was greatly increased by jequirity. I have applied the remedy hundreds of times and found that without exception it produces on a dry, not secreting, conjunctiva the characteristic croupous ophthalmia, but in cases in which there was intense papillary swelling and the conjunctiva was covered with a purulent secretion I have observed like yourself, a marked increase in the affection, the chronic purulent ophthalmia becoming acute and thus easily transmissible. It therefore necessarily follows that the remedy should not be employed when there are suspicions of chronic purulent ophthalmia, but restricted to those cases in which the granulations are dry or have been rendered so by previous cauterizations.

In what cases did I first recommend the remedy, and what was my main object in experimenting with jequirity? To drive out the method of inoculation with blennorrhoic pus, and treat such cases with a vegetable preparation. I certainly did not believe that instead of cases of old, dry granulations, fresh ones with purulent discharge would be selected to be experimented upon, as has been done.

When Deneffe had reported the results of his experiments with jequirity to the Brussels Academy, and come to the conclusion that the results of the new remedy were unsatisfactory, I said to myself that the conditions in Belgium were probably unfavorable, as many very likely were cases of chronic purulent ophthalmia, or at least complicated with it. I was soon to be convinced of the contrary, and to come to the conclusion that in Belgium in particular there were many cases fit for the jequirity treatment, for Coppez concluded his paper at the last Congress with the following words: "In conclusion I must acquit myself of a pleasant duty in delivering the message entrusted to me by one hundred and fifty Belgian trachoma patients, cured or improved with jequirity, in expressing to Dr. de Wecker, the courageous defender of jequirity, their warmest thanks. Thanks to de Wecker, the barbarous method of inoculation with blennorrhoic pus has ceased to exist. This testimony of mine is free from all suspicion, as I have employed this in-

oculation more than fifty times, and have often had occasion to appreciate its excellent results."

Those who have declared themselves against jequirity (about six against to thirty for it), have not chosen suitable cases, while those who selected cases of regressive or dry granulations with pannus, the least amenable to the usual kind of treatment, cannot express themselves with too much enthusiasm. For instance, Vallez states during the discussion at the Paris Congress, that seven patients were taken from the Hospital for Incurables, treated with jequirity, and discharged able to work. v. Hippel also, who accuses me of too great enthusiasm, says that patients who when admitted could not walk alone, were discharged able to work.

It is necessary therefore to distinguish closely between suitable and unsuitable cases according to the nature of the granulations and climate; and it seems probable that in warm countries like Algier and Egypt an endemic of trachoma complicated with purulent ophthalmia will frequently occur, thus precluding the application of jequirity, while northern countries like Belgium, Northern Brazil, etc., will receive a great blessing in it.

Every one must judge for himself, according to the intensity of the affection, how strong and how often the applications should be made. Coppez applies a ten-per-cent. infusion only once, because, in cases of well-developed granulations, he desires to make the first and most important inflammation as intense as possible, a second and third application not producing with certainty another inflammation of the intensity desired. (This immunity generally does not develop until after several applications have been made, but can then be so complete that even infusions of ten and fifteen per cent. produce no effect). Coppez may be right considering the kind of granulations he had to deal with, though, on the other hand, a physician practising in another part of the country may be equally successful with a three-per-cent. or five-per-cent. infusion. It is, therefore, impossible to formulate rules applicable to all cases, except that several applications of strong infusions should never be made in rapid succession;

that cases of purulent ophthalmia should be excluded from this mode of treatment, and that several weeks should be allowed to elapse before a second application of a strong infusion is made.

The efficiency of jequirity in simple and ulcerous pannus being established beyond doubt, its application was naturally extended to corneal affections not due to pannus, and one of my assistants, Dr. Menadro, reported at the late congress the results of his experiments on 300 patients made in the latter part of 1883. He concludes, that (1) torpid central corneal ulcers, especially those due to cicatricial keratitis, (2) torpid scrofulous pannus, with or without ulcers, and (3) the sclerosing degenerations after parenchymatous keratitis, may successfully be subjected to this treatment.

I would like to mention in particular the sequels of diffuse keratitis, which offer such a stubborn resistance to every attempt at clearing the cornea. In such cases we have been able to raise V from $\frac{20}{200}$ to $\frac{20}{30}$.

In corneal ulcers and scrofulous pannus the swelling of the conjunctiva and the amount of purulent secretion must, of course, be considered in determining whether jequirity may or may not be used with advantage, but this need not be taken into account in treating the results of parenchymatous keratitis.

The conjunctiva not being affected, an inflammation of any intensity desired can be produced according to the strength of the infusion by a single application. In the majority of cases an infusion of three per cent. was sufficient, producing two changes, which occupied our full attention. The first consists in a peculiar jelly-like chemosis, which develops during the inflammation upon the globe, and especially around the cornea, often persisting for some weeks, and vividly reminding me of the swelling of the conjunctiva due to fresh scars after iridectomy or sclerotomy in glaucoma. The tension is greatly reduced, being equal to $-T3$, where before it had been normal. Comparison with the eye not painted with jequirity, before and after application, proves that T is perceptibly diminished during

the inflammation, especially when the croupous exudation is very marked upon the globe and followed by a long-continuing chemosis. Perhaps this may be ascribed to a temporary loosening of the scleral tissue favoring filtration, and explaining the clearing up of the cornea by its increased nutrition.

According to my observations no danger attended the use of jequirity in parenchymatous keratitis and chronic infiltration of the cornea, which clear up with more or less certainty, and to a much greater extent than has ever been attained with syndectomy.

Some oculists not familiar with the use of jequirity cannot, perhaps, persuade themselves to apply it to torpid ulcers and scrofulous pannus, but it can be employed with perfect confidence in granular pannus and the sequels of parenchymatous keratitis. Once familiar with its mode of application, and its extraordinary remedial power as regards the clearing up of the cornea, they will not hesitate to use it and extend its application.

Once more I would emphatically state that a single application even of strong infusions will produce a violent inflammation without endangering the cornea or producing scars on the conjunctiva, when there is no purulent secretion. The greatest caution should be exercised when such a condition threatens, and when it is manifest, jequirity is contra-indicated.

You see that I certainly do not consider the remedy I have introduced into ophthalmology to be a panacea, but I consider myself justified in recommending jequirity as a beneficial agent in such cases as I have set forth, especially if they have resisted all other remedies to a greater or less extent.

JEQUIRITY.

By Dr. HASKET DERBY, Boston.

DURING the past ten years, more than three thousand cases of granular conjunctivitis have been treated at the Massachusetts Charitable Eye and Ear Infirmary, forming about five per cent. of all cases of eye-disease applying for relief. The relative number of those admitted to the house for treatment, I am unable to give with any exactness; suffice it to say, that no other disease is as well represented. My impression is, that more than half our beds are regularly occupied by such patients.

The treatment by jequirity was introduced in September, 1883, and, by December, hardly a case of granular conjunctivitis was left in the Infirmary.

Our experience in the management of this disease has thus been completely changed. Widely spread, as it is among the poorer classes of this portion of New England, and intractable and treacherous as it has always hitherto proved, when subjected to the ordinary methods of treatment, the discovery and introduction of this new method must be reckoned a most important advance in ophthalmic medicine. It promises to go far toward restricting the range and removing the consequences of one of the hitherto nearly hopeless affections. Should the result of treatment by jequirity continue as marked as at present, and should the effect prove permanent, the new method will deserve to be mentioned in the same breath with the introduction of iridectomy for glaucoma, or the treatment of simple chronic asthenopia by the system of Dyer.

Our experience in the use of jequirity at the Infirmary

has been fully given by Dr. Standish, one of our present internes, in the Report for 1883. Little more is now attempted than to summarize his statement.

The preparation we have used has been made in the usual manner,—ten grammes of the pounded bean being macerated in five hundred grammes of cold water for twenty-four hours, free exposure to the air being maintained during the whole process. Each patient subjected to the treatment receives a freshly prepared infusion. The application is made by himself, the eyes being freely bathed, fifteen minutes at a time, three times a day, and the treatment ordinarily continued for three successive days.

Great differences are met with in the action of the drug in separate cases. Some go through the three days with the usual amount of reaction; while, with others, the use of the lotion has to be suspended after three or four applications, owing to the violent effect produced. Where the infusion was properly prepared, it has invariably produced the specific inflammation to a greater or less extent. Our only failures to excite inflammation were due to using an infusion that had been prepared in closed jars.

The symptoms of the jequirity ophthalmia are so familiar to ophthalmologists, and have been so often described, that no reference need be made to them here. After the lapse of ten days the feeling of roughness has disappeared, and the lids are found to be comparatively smooth. The use of atropine for any corneal affection is apt to cause conjunctival irritation after jequirity. Patients should be discharged from the hospital as soon as the treatment is concluded. This is a very important point, inasmuch as they are apt to relapse if kept in the house under observation, and to remain well outside.

Our results, in the fall of 1883, were as follows: Out of thirty eyes, the pannus more or less cleared in twenty, remained stationary in five, while vision fell off in five cases; four of these latter, as will be seen by the appended table, owed their non-improvement to corneal complications.

Pannus.	Vision before Treatment.	Vision after Treatment.	Corneal Complications.
Entire cornea opaque.	V o. d. 0.01	V o. d. 0.1	None.
Upper half of cornea opaque.	V o. d. 0.016 V o. s. 0.05	V o. d. 0.2 V o. s. 0.3	None.
Thin grayish pannus of entire cornea.	V o. d. 0.1 V o. s. quant	V o. d. 0.1 V o. d. 0.1	None.
Thin grayish pannus of upper half of cornea.	V o. s. 0.1	V o. s. 0.05	None.
Thin grayish pannus of upper half of cornea.	V o. s. 0.3 V o. d. 0.1	V o. s. 0.3 V o. d. 0.1	None.
Vascular pannus, upper half of cornea.	V o. d. 0.016	V o. d. 0.02	Small ulcer.
Upper half of cornea opaque.	V o. s. 0.1	V o. s. 0.6	None.
Thin gray pannus over entire cornea.	V o. d. 0.01	V o. d. 0.08	None.
Thin pannus, upper half of cornea.	V o. d. 0.1 V o. s. 0.008	V o. d. 0.4 V o. s. 0.1	None.
Dense pannus over upper half of cornea.	V o. d. 0.3 V o. s. 0.1	V o. d. 0.4 V o. s. 0.3	None.
Thin grayish pannus over upper half of cornea.	V o. d. 0.08	V o. d. 0.4	None.
Thin grayish pannus of upper third of cornea.	V o. d. 0.1	V o. d. 0.3	Ulcer of cornea.
Slight pannus above.	V o. d. 0.3	V o. d. 0.3	Ulcer of cornea.
Thick pannus over center of cornea.	V o. s. 0.05	V o. s. 0.05	Ulcer of cornea.
Vascular pannus over upper half of cornea.	V o. s. 0.3 V o. d. 0.1	V o. s. 0.1 V o. d. 0.05	Many ulcers of cornea, one of which perforated
Thin gray pannus, upper half of cornea.	V o. d. 0.1	V o. d. 0.3	None.
Thin gray pannus, upper third of cornea.	V o. s. 0.1	V o. s. 0.2	None.
Thick whitish pannus over upper half.	V o. d. 0.1 V o. s. 0.05	V o. d. 0.2 V o. s. 0.2	None.
Vascular pannus, upper half of cornea.	V o. d. 0.1	V o. d. 0.01	Several severe ulcers of cornea.
Thin gray pannus, upper third of cornea.	V o. s. 0.1 V o. d. 0.2	V o. s. 0.3 V o. d. 0.4	None.
Same.	V o. d. 0.2	V o. d. 0.4	None.
Same.	V o. d. 0.2	V o. d. 0.1	Several small ulcers of cornea.

We are unable to corroborate De Wecker's experience, with regard to the immunity of the cornea from participation in the process induced by jequirity. Seven cases out of twenty-four were followed by corneal ulcerations, all more or less serious. Previous injuries of the cornea, as well as a previous tendency to ulceration, seem to act as predisposing causes; and in such cases the jequirity, if not absolutely contra-indicated, needs to be employed with much caution. It is also contra-indicated in cases where the granulations are large and florid, and cause much external fulness of the upper lid.

JEQUIRITY.

By Dr. J. J. CHISOLM, Baltimore.

I have used jequirity quite extensively at the Presbyterian Eye and Ear Charity Hospital, and find it a very valuable addition to the list of remedies for the successful treatment of trachoma with pannus. Cases which would yield to no other treatment improved at once after an attack of jequirity inflammation. I found *no uniformity in the susceptibility of patients.* I have seen œdematous lids, injected watery conjunctiva, with the greenish-yellow croupous deposits after twenty-four hours' use of the solution, or four instillations into the eye. In other instances, two or three days would be necessary to excite the needful degree of inflammation. Again, I have used diligently and freely the eye-drops for ten days before croupous deposits were excited, and then only to a limited degree. The solution was made by digesting the coarsely pulverized bean for twenty-four hours in cold water, a two-per-cent. solution. When the patient seemed to resist the action of the solution, its strength was doubled, and on one occasion increased to ten per cent. It was dropped freely into the eye three or four times a day; in some rebellious cases as often as every hour during the day, the patient lying down with face upturned so as to have the conjunctiva sac flooded with the liquid. In *all cases it produced more or less pain.* In some the pain was very severe, requiring the free use of morphia. One patient took four doses of ¼ gr. each during the night to obtain relief from suffering. In three cases, all stout men, systemic irritation from this irritating eye-drop

was, marked by severe rigor, and high fever, coming on within 24 hours after the first instillation of the jequirity solution. In one patient there was occasion to repeat the jequirity inflammation after an interval of a month and the severe chill was promptly reproduced.

The vascularity of the cornea was always increased, with such a degree of clouding as to obscure vision. This clouding and vascularity rapidly diminished when the application was suspended. In one case a *perforation of the cornea* occurred during the application of the jequirity. The ulcer healed promptly, and the pannus disappeared when the remedy was suspended. There had been no tendency to ulceration before the jequiritic inflammation had been excited. In a case of granular conjunctivitis, sequel of purulent or catarrhal ophthalmia, in which the cornea was good, the application of the jaquirity solution caused such a sudden and decided infiltration of the centre of the cornea that I very much feared that it would give way. The cornea soon recovered when the application was stopped.

In many cases I found a *repetition of the remedy* necessary after a few weeks, the eye improving up to a certain state, and then remaining quiescent. A second attack of croupous inflammation would always bring about a better condition. I found *relapses much less common after jequirity than from any other treatment* that I had ever used for suppressing granular lids. I have met with a few cases in which the repeated excitement of jequirity inflammation has not effected a cure of the pannus.

I have restricted its use to cases of trachoma with pannus. The only clear cornea to which I applied it became speedily infiltrated, and I thought threatened a serious complication. I have not used it in case of corneal clouding from other causes. In every case only freshly-prepared solutions were used, never over three days old. From my present experience of now fully twelve months, and in a large number of cases, I believe jequirity to be by far the most reliable remedy of the pharmacopœia for the cure of granular lids with pannus. Its action in exciting a peculiar croupous

inflammation is prompt. The conversion of the intractable form of chronic inflammation, so characteristic of trachoma, into an acute form of croupous inflammation which shows a marked tendency to convalescence as soon as the immediate cause of this specific irritation is removed, is very remarkable.

I have seen two cases in which violent purulent ophthalmia showed itself when the eyes were quite convalescent from the jequirity inflammation. The cases were still in hospital and had not been exposed. What connection there was between the treatment and this unlooked for attack I have not determined.

March 7, 1884.

EXPERIENCE WITH JEQUIRITY AT THE MANHATTAN EYE AND EAR HOSPITAL, NEW YORK.

By DAVID WEBSTER, M.D., New York.

I REGARD the use of jequirity as one of the most valuable additions to the ocular therapeutics of this or any other age, and Dr. de Wecker, who introduced it to the profession, as a public benefactor.

I know of no remedy that can compete with it in efficacy in the cure of trachoma with pannus. No one who will take the trouble to read the cases herewith reported can remain skeptical as to its potency when freshly prepared, of the proper strength, and thoroughly applied. The failures that have been from time to time reported, have undoubtedly been due to inexperience in its use, or to worthlessness of the preparation employed. The inflammation set up by it is sometimes so severe as to cause apprehension lest it might produce sloughing of the cornea, as in purulent conjunctivitis. Hence, I would not venture to recommend its thorough use except in cases where considerable vascularity of the cornea exists. Experience, however, seems to indicate that its effects may, to a certain extent, be regulated, and that it may be very cautiously used in cases of granular lids, without pannus, with good results. In such cases I have brushed a little of the infusion upon the inner surface of the upper eyelid twice or three times a week, carefully watching the effect, and discontinuing the remedy if any irritation seemed to be produced. A number of out-patients were considerably improved under this method of treatment.

Through the kindness of my associates at the Manhattan Eye and Ear Hospital, I am enabled to report, somewhat in detail, thirteen cases in which jequirity was used, these being all the cases of which there are reliable records. In the order in which they are arranged, the first six belonged to Dr. C. R. Agnew's clinic, the first four having been under my special care, and the next two under the care of Dr. George F. Carey. The remaining seven were all patients of Dr. D. B. St. John Roosa.

I am indebted to Dr. J. M. Ray, the house surgeon, for the notes of the cases, and for the following remarks:

"It was found that the infusion was always more active when newly made. Precautions were taken by putting it in a cool place, in the summer in an ice-chest, but under no precautions could it be made to act satisfactorily after being kept over two weeks.

"When it begins to decompose its odor changes from a rather sharp and pungent one to that of stagnant water or decayed vegetable matter. It also loses its pinkish hue, and a deposit is formed.

"In cases where a membrane was produced once, it was always longer in being produced by a second application. In the case of Nellie J. we did not succeed in producing a membrane a second time, although a fresh infusion was applied six or seven times a day for several days in succession, and that very thoroughly.

"In the case of John C., who was treated as an outpatient, and who received only one application a day, no membrane was formed at all, only considerable lachrymation and redness, and yet the ultimate result was about the best in the entire series."

Case 1.—Mrs. M., aged thirty-eight, came to the hospital Oct. 3d, 1883, with granular lids and pannus of both eyes. The disease dated from childhood. She had slight photophobia, her eyelids were somewhat swollen and red, her corneæ were vascular, with an ulcer of the left, and opacities of both which were evidently of long standing. A cantholysis was done upon both eyes on the day after admission, and iced cloths were applied for a few days until the inflammatory reaction had subsided. The

improvement resulting from the operation was slight, and on Oct. 10th jequirity was applied to the left eye which was much the worse eye. Two applications of a fresh infusion were made to the conjunctival surface, and to the outside of the lids. The following morning the reaction was severe, the patient complaining of a great deal of pain. A thick croupous membrane formed upon the conjunctiva which, with the lids, became considerably swollen. Iced cloths and atropine were used to allay the inflammation.

On Oct. 15th, the conjunctiva appeared to be dry, the exfoliated membrane seemed to adhere to the cornea, and the patient complained that the eye would "stick" when she tried to move it about. The use of atropine was then stopped, the eye was frequently bathed with hot water, and was kept well lubricated with vaseline. Glycerine and castor oil were also tried, but were found to be less soothing than vaseline. The patient was discharged on the 22d, the eye still showing a tendency to xerosis of the conjunctiva. The vision was not recorded in this case, either before or after the use of jequirity, but the records say "improvement was not marked." Dr. S. B. St. John, of Hartford, Ct., under whose care this patient placed herself on leaving the hospital, informed me some time afterwards that the eye had not gone on to xerosis, but was improving.

Case 2.—Lizzie F., aged about sixteen, with "old granular lids and pannus," was admitted to the wards of the hospital in the spring of 1882, and was treated with hot water and astringent applications for an acute attack of keratitis in which the left eye was the worse. Having improved considerably she was discharged, but continued an out-patient of the hospital. She had numerous attacks of vascular keratitis, each of which left her vision worse than before. On Nov. 13, 1883, a free cantholysis was done on the left eye, and she was placed in a ward where she remained under treatment of sulphate of copper, etc., and was again discharged improved.

She was admitted a third time on Dec. 28th. The left cornea was "fleshy," the lids thick and granular, and the photophobia extreme. Jequirity was then applied thrice daily for three days with no effect other than to make the eye more irritable. The infusion used was an old one. A fresh infusion was now obtained, and three applications of this produced swelling and redness of the lids with characteristic grayish membrane. Iced

cloths and atropia were then used. The membrane was persistent, lasting nearly a week. Before jequirity was used there was so much photophobia that no attempt was made to test the vision, but from the appearance of her cornea it was believed that she had little more than perception of light. When she was discharged on January 8, 1884, she had vision $\frac{20}{200}$. The lids had lost much of their thickness, the cornea was comparatively clean and only slightly vascular, there was very little redness of the eyeball, there was no photophobia, and the granulations were mostly gone.

Case 3.—Miss Mary K., aged eighteen, consulted me at the office Aug. 28, 1882. She said that her eyes had been sore off and on since the preceding Christmas, but never before. The palpebral conjunctiva of her right eye showed those atrophic and cicatricial changes which are so often seen after recovery from granular lids. The cornea was clear, the eye free from irritation, and the vision $\frac{20}{30}$.

The left eye was the subject of severe granular lids and pannus, and its sight was reduced to perception of light. Upon the following day, after consultation with Dr. Agnew, she was advised to have a cantholysis done upon the left eye. The operation was soon after performed at the Manhattan Eye and Ear Hospital, but with only temporary good effect. The ulceration of her cornea was not arrested, and on Sept. 9th she came to the office with perforation of the cornea and an empty anterior chamber. The eye was then kept bandaged, the bandage being removed at frequent intervals, the eye cleansed, and the bandage reapplied. Under persistent treatment the ulcer healed, and the eye became considerably improved, but did not get entirely well, and was always subject to periods of exacerbation.

On the 16th of October, 1883, in the midst of a very bad attack, she was taken to the hospital to be treated with jequirity. For several days an infusion was used which had been in the hospital for some time, and little or no effect was produced. Two applications of a fresh infusion to the inside and outside of the lids produced a marked reaction. The membrane appeared upon the conjunctiva, the lids were swollen, and the patient complained of headache and pain about the eye. Iced cloths were then used for from ten to fifteen minutes every hour for two days, when the conjunctival membrane was mostly thrown off. Atropine was then used daily for a week, when the patient was discharged.

On entering the hospital there was marked pannus crassus, with

great photophobia. The cornea was covered with blood-vessels and exudations, and it was difficult to hold the eye open. The vision was only perception of light. When discharged, the eye was open, and with it the patient could see large objects. She was seen again on March 7, 1884. She had had no further attacks of keratitis, and the vision had risen to $\frac{10}{200}$. There were no indications for further treatment.

CASE 4.—Mary S., aged eighteen, was admitted to the hospital for jequirity treatment on February 23, 1883. Her trachoma had been treated for several years with the ordinary astringents and caustics. She had, all along, been subject to repeated attacks of keratitis with increasing vascularity of the cornea and corresponding diminution of the sight. A cantholysis was done upon both eyes, but failed to prevent the recurring exacerbations. The right eye exhibited a tendency to staphylomatous bulging of the cornea, which had been perforated by ulceration and had healed with synechia anterior. At the time the jequirity was applied the cornea was so opaque and vascular that the iris could not be seen. The left eye was not nearly so bad, the patient seeing sufficiently with it to get about alone. The jequirity infusion was applied to the everted lids, and a mass of absorbent cotton saturated with the infusion was applied externally to the lids for ten or fifteen minutes. After the remedy had been applied in this way thrice daily for three days, the inflammation had reached such a height that it was thought prudent to stop it. The characteristic membrane was produced. Iced cloths and atropine were then used until the membrane was thrown off and the inflammation had subsided. She left the hospital much improved, and continued under treatment as an out-patient until she had another severe attack of keratitis in the right eye. She was then admitted again, and the jequirity infusion was applied to this eye a second time. The membrane was produced, with the other characteristic symptoms, as before, and the result showed great improvement. Before the use of jequirity, in this case the vision was only perception of light in the right eye, and $\frac{10}{200}$ in the left. On March 7, 1884, the vision was R. $\frac{10}{200}$, L. $\frac{18}{100}$, and the eyes were nearly free from inflammation.

CASE 5.—John W., an adult Irishman, with "old granular lids and pannus," had a cantholysis done upon both eyes on September 19, 1883, after having been treated with astringents for some

weeks. He had slight relief after the operation, for a while, but had frequent acute exacerbations of his old trouble. On February 15, 1884, he had developed a large central ulcer of his left cornea with considerable opacity about it. The cornea was also very vascular. One application of the jequirity at night produced before morning the membrane with œdematous swelling of lids, chemosis of conjunctiva, fever, and headache. Iced cloths and atrophine were applied. Before the use of jequirity he could count fingers when held quite close to the eye. After a week he was discharged from the wards, and continued under treatment as an out-patient. On March 7th the vision was $\frac{16}{200}$ and the eye was still improving.

Case 6.—Nellie J., who had "old granular lids and pannus" of the left eye, was for some time treated with sulphate of copper and with powdered boric acid rubbed into the everted lids with the thumb. A cantholysis was done upon the affected eye with the effect of temporarily relieving the symptoms, which, at the time of the operation, were severe, the patient being unable to open the eye. She was again admitted to the wards in December, 1883, and was treated by the usual methods, but as exacerbations continued to recur it was decided to give her the benefit of a trial of the jequirity treatment. On February 5th, when this treatment was commenced, the vision was reduced to ability to discern large objects. The infusion was applied thrice daily for three days, when the membrane was formed accompanied by the usual inflammatory symptoms. Iced cloths and atropia were then resorted to. On March 7th, the vision had risen to $\frac{20}{200}$.

An old solution was first used upon this patient, but repeated applications failed to produce any reaction. The fresh solution produced the characteristic inflammation after eight or nine applications. After the inflammation had subsided the fresh solution was again applied, but no membrane could be produced, although it was applied four or five times a day for several days, both on the conjunctival surface, and on the outside of the lids by dipping a piece of cotton in the infusion and letting it remain on the closed eye for fifteen minutes after each application to the conjunctival surface.

Case 7.—James H., aged thirteen, who had "trachoma and pannus of left eye, and complete leucoma and staphyloma of right," came to the clinic, April 24, 1883, and was ordered

atropine, astringents, and hot water. He was treated with these up to May 15th, when jequirity treatment was commenced, but being an out-patient, the applications were not made regularly, and no reaction was set up. June 5th, he came into the wards and jequirity was applied thrice daily. This produced no effect, and the application was made six times daily, and the patient was given some of the infusion in a saucer, with a piece of cotton, and was set to bathing his eyes with it for five or ten minutes at a a time. In this way a considerable amount of inflammation was produced after two or three days, when the jequirity was stopped, and iced cloths and atropine were used. After subsidence of the inflammation sulphate of copper was applied to the lids each morning. A second attempt was made to excite the jequirity inflammation but without success, although a fresh solution was used.

When this patient came to the hospital the vision of his right eye was lost, and that of the left was reduced to ability to see large objects, and he was led to the clinic. The opaque and staphylomatous right cornea was covered with bloodvessels, was fleshy, and the lids were granular. The left cornea was vascular, and there were ulcers on it with numerous opacities. The lids were swollen and the granulations were thick. He remained in the hospital during the whole summer, being discharged about August 12th. When discharged the conjunctivæ of both eyes were smooth though atrophied. There were no bloodvessels on the right cornea, and there was a small, partially transparent space near the upper margin through which he could see "shadows of objects." The left cornea was free from bloodvessels. There was no redness of the ocular conjunctiva, and he could read print the size of No. 10 or No. 12 Jæger. He has since been at the hospital, and has had no recurrence of the keratitis.

Case 8.—William P., aged twenty-seven, came to the clinic August 25, 1883. He had "old granular lids and keratitis." His eyes had been sore since his earliest recollection, and he had been prevented from attending school, when a boy, on account of his sore eyes.

When he came to the clinic his lids were granular, his corneal slightly vascular, and with numerous opacities. He was subject to recurring attacks of keratitis. He came into the hospital and was treated for nine months with the whole list of astringents, with the effect of somewhat improving the right, but the left still had

recurring exacerbations. He was discharged from the hospital on January 30th, and was thought to be out of danger. He returned in a week with the left eye as bad as ever. One application of jequirity in the evening produced, before morning, the characteristic membrane, with considerable red, tense swelling of the lids, and chemosis. Iced cloths and atropia were then used.

March 7th.—The jequirity inflammation does not seem to have had much effect. The left eye is now suffering from an attack of keratitis.

Case 9.—Louise K., aged eighteen, came to the clinic July 11, 1883, with "old granular lids and vascular corneæ." She was treated with atropine and hot water, applied at home, and sulphate of copper, applied at the hospital, three times a week. For a time, during August, she came to the morning clinic and had the sulphate of copper applied daily, and her conjunctiva afterward sprayed with salt and water. Her eyes improved somewhat, but she attended irregularly, and on Feb. 5, 1884, there was marked vascularity of both cornea, with a central ulcer of the left, which had perforated two or three times, but had healed without anterior synechia.

R. V. = $\frac{20}{200}$, L. V. = Perception of light. She was taken into a ward, and four applications of jequirity produced a membrane which was thick and adherent, especially on the lower lid, and when removed with forceps there was found to be a tendency to symplepharon below.

The inflammation was treated with iced cloths and atropine. On March 6th : R. V. = $\frac{20}{200}$, L. V. = $\frac{16}{200}$. Vascularity of cornea greatly diminished, and left eye looking clearer than its fellow.

Case 10.—Margaret C., aged twenty-two, had "trachoma and pannus" of eight years' standing. She was in the hospital at 34th Street for a period of some weeks. She came again to the clinic on January 4, 1883, with a fresh attack, and was treated as an out-patient up to July 1st. During the eight years that she had trouble with her eyes, she had been subject to recurring attacks of keratitis, and had received treatment of every kind. On June 5th it was decided to use jequirity, and a solution which had been kept on ice in the hospital for some time was applied every morning for a week or ten days, and then irregularly till July 1st, when she was admitted to the hospital, no reaction having been produced. A fresh solution was then applied, and after two applica-

tions a membrane was formed, when the jequirity was stopped, and atropine and iced cloths applied.

At the time of her coming to the hospital, there was marked photophobia and lachrymation; the cornea was vascular and cloudy; the lids were swollen, red, and granular, and the ocular conjunctiva chemotic. On July 9th she was discharged. The vision was not tested either before or after use of jequirity.

Nov 20th.—Has had no trouble since the jequirity treatment. Conjunctivæ perfectly smooth; corneæ clear.

CASE 11.—James K., aged twenty-one, had "trachoma and vascular keratitis" of two years' standing. The right eye had been cured by constant treatment, sulphate of copper, nitrate of silver, and tannin and glycerine having been used. But the left resisted all treatment, although, being an attaché of the hospital, his eyes had constant care for eighteen months. In May, 1883, the upper half of the left cornea was covered with blood vessels, there was photophobia, and vision equalled only perception of light. Jequirity was applied in the usual way thrice daily. It was discontinued after the third day, a membrane having been formed. Iced cloths and atropia were then used. The inflammation gradually subsided with marked diminution and vascularity. In June the application was repeated with still more favorable results. At the end of a month the cornea contained only four or five small blood vessels. He has had no attack of keratitis since jequirity was applied. Before it was used a severe attack occurred every few weeks from the slightest cold or exposure. Vision=$\frac{20}{100}$ each eye, slightly improved by a concave glass.

CASE 12.—John C., aged twenty-nine, came to the clinic on Feby. 20, 1883, with "trachoma and vascular keratitis." The edges of his eyelids were swollen. He was ordered an ointment of the red oxide of mercury, gr. ij to vaseline 3 j, to be applied once a day.

March 17th.—He came to the clinic, and said he had "taken cold" in his left eye. It was much inflamed, and he was ordered atropine, hot water, and colored glasses to protect his eyes from the light.

March 29th.—Left eye much better. Was ordered to use the ointment of mercuric oxide on both eyes.

May 29th.—He came to the clinic with both eyes much worse, having been six weeks without treatment. The lids of both eyes

were swollen, there was profuse lachrymation, and the photophobia was so great that the patient could with difficulty make his way about. Under the use of atropia, hot water, and "blue-stone" the eyes improved slowly, but had recurring attacks of eratitis, the left being always the worse. Jequirity was finally applied to the left eye. He was treated as an out-patient, and came irregularly. The infusion was applied six or seven times during ten days. No characteristic membrane was formed, but considerable inflammation was excited. This was treated with atropine. Upon recovery the cornea was clear and the lids smooth. He was advised to have it applied to the right eye, but he said that "one good eye was enough for him." He has had no further trouble with it since jequirity was applied.

CASE 13.—Mrs. Addie O., aged twenty-six, came to the clinic Feby. 24, 1883, with "trachoma and vascular keratitis," and was ordered to come for an application of sulphate of copper three times a week. She lived out of town, however, and did not attend very often.

July 7th.—She came to the clinic with her eyes much worse, and was advised to remain in the hospital. She did so, and sulphate of copper was used on both eyes daily for four weeks. At the end of that time, R.V. = $\frac{20}{200}$, L.V. = $\frac{3}{200}$. Jequirity was then used on the left, being applied thrice daily, by dipping in the infusion a probe with a little cotton on the end of it, and sopping it on the everted lid. After seven applications a thick membrane was formed, and there was considerable swelling of the lids and chemosis. Iced cloths and atropine were then ordered, until the eye became quiet. After two weeks the application was repeated, a fresh infusion being used. Three applications produced the characteristic membrane, and iced cloths and atropine were again substituted. Meanwhile the right was treated with sulphate of copper, and after the inflammation in the left had subsided, sulphate of copper was used on it also till the patient was discharged on Oct. 29th.

When the patient came to the hospital all her letters had to be read to her, as she could not see to read them herself. After the inflammation from the second application of jequirity had subsided she read her own letters and postal cards, and wrote to her friends.

Nov. 20th.—She came to the clinic for observation. The conjunctiva of both lids of the left eye was smooth. Both corneæ were much clearer, the left apparently clearer than the right, and the vision of each eye was $\frac{20}{200}$.

JEQUIRITY (ABRUS PRECATORIUS) IN THE TREATMENT OF GRANULAR LIDS.

By LE ROY POPE WALKER, M.D.,

HOUSE SURGEON NEW YORK EYE AND EAR INFIRMARY.

SO much has been written for and against the use of jequirity, that every one is familiar with the details. As so much adverse testimony has been brought forward, I should like to add my mite to such as is, I think, in its favor. There have been many failures reported, both in this country and abroad, coupled with positive damage and, in some instances, destruction of the eye. In my experience, based on observations in thirteen cases, I have never seen any *bad* effects, but, on the contrary, in most instances, good results. I claim that it hastens the healing process many months. Without its aid, in most cases, I believe it would require a year or more to effect a cure. But with its peculiar affinity for and destruction of trachomatous tissue, I believe one can accomplish the result in one quarter the time; or even much less, if the preparation be active and reliable. I have tried the infus. jequirity as made by some of the best chemists in the city (according to de Wecker's formula), but, for some reason, I found them all uncertain. The preparation of the jequirity bean, as made by the Infirmary druggist, I have always found efficient, even after keeping six months at a temperature of 65° to 70° F. I believe, also, that the failures reported have been largely due to inferior preparations, where the effect has been *nil;* and in the cases where injury has resulted, or worse, destruction, to want of proper care and

attention. In all the cases I have seen the reaction was marked, and in some very severe. All, however, yielded to cold and cleanliness, and in no instance was there harm resulting from its use. The membrane was present in all instances. The severer symptoms yielded readily to cold (ice compresses) and bathings with a saturated solution of boracic-acid. In all cases atropia (grs. ij. to ʒ i.) was used for the relief of pain. After the more acute effects had subsided, I found the lids much reduced in thickness and smoother, with partial or complete destruction of the pannus. With the aid, now, of the standard remedies, the cure should be rapid and radical. Constitutional disturbance was noted in only one instance, in which the patient suffered from nausea, diarrhœa, and general malaise. In another case, in which the temperature was taken, the thermometer indicated a rise of 1°, which, however, was unaccompanied by general disturbance.

Case 1.—Hosp. No. 4899.—J. F., male, æt. thirty, (Dr. Callan,) admitted March 29, '83. Has well-marked gran. lids and pannus, O.U. Pannus occupying upper third of both corneæ. Has had gran. lids for two or three years, for which he has been treated with copper, silver, and alum, with only moderate success. Was treated for one month in Infirmary with copper, alternating with silver (grs. v.), and occasionally boracic-acid pulv. dusted over everted lids. There has been some improvement in granulations, but the pannus has remained unaffected.

April 27th.—Began the use of jequirity. Lids (O.D.) having been everted, infus. was applied freely (once during day) with camel's-hair pencil. Ordered to bathe lids every hour with the same.

April 30th.—This method has been kept up until to-day, and having no effect, a change was made in the use of jequirity. Instead of one application, I now make four daily, to everted lids. Bathings continued as before. In O.S., have continued dusting boracic-acid pulv. once a day.

May 1st.—Severe reaction. Lids much swollen, lachrymation, pain, photophobia, and slight discharge (muco-purulent). On everting lids, a distinct membrane was disclosed, covering entire upper lid. Easily removed. Atropia (grs. ij. to ʒ i.) t.i.d. Lids bathed every two hours with sol. boracic-acid (saturated). Treatment with jequirity continued.

May 3d.—Ophthalmia not so active as on 1st inst., and cornea still unaffected.

May 10th.—Although jequirity seems to have no further effect, applications continued (four times daily), and **instillations** (one half dozen drops) now substituted for **bathings.**

May 20th.—This vigorous treatment has been kept up uninterruptedly since 10th inst., without any further reaction. Jequirity now discontinued. Lids are smoother, however, than before using infus., although pannus remains as before. The condition of O.S., which has been treated entirely with boracic-acid pulv., is almost as good as O.D. Both eyes now treated with boracic-acid pulv.

May 24th.—Patient left Infirmary.

CASE 2.—Hosp. No. 7720. R. W., female, aged eighteen (Dr. Moore), admitted April 16, '83. Well-marked granulations, with pannus, upper half O. D., of two years' standing. Has been treated with copper and alum for two months, but with very little improvement.

April 16th.—Began the use of jequirity. Applied infus. three times during day to everted lids, and ordered to bathe lids every two hours with the same.

April 17th.—Severe reaction has followed. Lids swollen, lachrymation, pain, and photophobia, with some discharge (mucopurulent). Slight membrane on upper lid. Cornea unaffected. Atropia (grs. ii—℥ i) t. i. d., and sol.-boracic-acid bathings every two hours. Treatment continued.

April 23d.—No further reaction has followed, and no other membranes formed. Applications now four times daily.

Evening.—Membrane formed on upper lid, and cornea somewhat hazy (in and about pannus). Jequirity continued. Atropia t. i. d. and parts kept clean with sol. boracic-acid.

April 26th.—Ophthalmia not so severe, though use of jequirity continued. Corneal haziness the same. Atropia and sol. boracic-acid as before.

May 1st.—Jequirity, which had been used until to-day, now discontinued. Cold compresses (ice) and sol.-boracic-acid washings, every two hours. Atropia t. i. d. Haziness of cornea fading. No pain.

May 3d.—Swelling entirely gone. No discharge. No pain, very little photophobia, and pannus *entirely* destroyed. Opens eye a little. Touched lids very gently with copper.

May 22d.—Patient discharged. Treatment with copper and alum had been continued in interim. Lids entirely free from granulations, thin and smooth. Cornea clear of pannus. Very slight opacity of cornea, in region formerly occupied by pannus.

Nov. 1, '83.—Saw patient for first time since discharge. There is just the faintest opacity of cornea in upper segment. She is able to see fully as well with this eye as with its fellow, which was unaffected. Has been treated for past four months, in out-door department, with copper and alum.

CASE 3, Hosp. No. 5480.—B. O'C., male, æt. twenty, (Dr. Minor,) admitted April 16, 1883. Gran. lids and pannus, O. U. Has had gran. lids for past five or six years, for which he has been treated intermittently. Present condition: Heavy granulations, covering upper lids, soft and juicy; pannus occupying upper halves of both corneæ. Has been treated for past nine days with boracic-acid pulv., liberally dusted on everted lids, O. U. Not improving sufficiently, it was decided to try jequirity.

April 26th.—Jequirity was applied (O. D) three times during day (to everted lids), and ordered to bathe lids with the same, every two hours. In O. S. continued use of boracic-acid pulv.

April 30th.—No reaction at all had manifested itself until this morning. Lids now swollen, lachrymation, pain, and slight muco-purulent discharge; no membrane, and cornea unaffected. Atropia t. i. d. Treatment continued.

May 1st.—Swelling increased, discharge more abundant, and eye painful. Extensive membrane on upper lid, which was easily removed. Cornea slightly hazy. Atropia t. i. d., and sol. boracic-acid ordered to bathe lids every two hours. Continued jequirity.

May 3d.—Condition much the same. No other membrane has formed. Cornea more hazy in region of pannus. Atropia and sol. boracic-acid as before.

May 5th.—Ophthalmia not so active, and infus. seems to be inert, though still continued with same frequency.

May 6th.—Discontinued jequirity. Lids smoother than before using infus., and pannus a little reduced, but no very marked improvement. Cold (ice) compresses every two hours. Sol. boracic-acid, and atropia t. i. d.

May 8th.—Began dusting boracic-acid pulv. on everted lids. Reaction entirely subsided.

May 17th.—Having obtained an infus. jequirity, made by another chemist, began using it again to-day. Four applications during day to lids, and lids bathed hourly.

May 18th.—Lids much swollen, lachrymation and pain. Slight muco-purulent discharge. Cornea somewhat hazy. No membrane. Eye bathed every two hours with sol. boracic-acid, and atropia instilled t. i. d. Jequirity continued.

May 20th.—Discontinued use of jequirity. Lids found to be much smoother and granulations reduced, as also all the larger vessels of pannus. Cold (ice) compresses every hour, lids bathed with sol. boracic-acid, and atropia t. i. d.

May 24th.—All inflammatory reaction gone. Lids much improved, and pannus seeems to be gradually fading. Lids now touched very gently with copper. Atropia t. i. d.

May 25th.—Began using boracic-acid pulv., applied freely to everted lids, O. U. The condition of O. S. is also much improved under the steady use of boracic-acid powder, though pannus is about as before.

June 2d.—Patient discharged.

Case 4.—Hosp. No. 6341. J. T., female, æt thirteen, (Dr. Callan,) admitted May 14, 1883. Has had granular lids and pannus for two years. Was treated most of the time, with some improvement. Present condition: Lids very granular, thick and firm, and pannus of upper half of each cornea. Some vessels, however, running down over lower segment, in each eye. Great photophobia. She has been treated with copper and boracic-acid pulv. for the past three months, lids being scarified every other day. Improved a good deal under this treatment, but being slow, it was decided to try jequirity.

August 15th.—Jequirity was applied four times during day to everted lids, O. U., and *instilled* once every hour.

August 28th.—Jequirity having proved inactive, a preparation made at the Infirmary was used to-day, four applications a day and hourly instillations.

August 29th.—Lids much swollen, tense and hot; some discharge. Cornea slightly hazy, membrane on each upper lid. Atropia t. i. d., with bathings sol. boracic-acid; jequirity continued.

August 30th.—Discontinued infus. Ice compresses, boracic-acid solution, and atropia continued.

September 1st.—Reaction subsiding rapidly. Lids are somewhat smoother. Corneæ still hazy. Solution boracic-acid and atropia continued.

September 3d.—Lids are much smoother, and granulations are fading. Corneæ clearing. Nearly all the larger vessels of pannus

are destroyed. Dusted boracic-acid pulv. freely on everted lids, O.U., and atropia t. i. d.

September 15th.—Discharged; lids very much improved, and a very few fine vessels, at limbus, remaining of pannus. Is able to bear light well. Have used boracic-acid pulv., with occasional applications of copper.

CASE 5, Hosp. No. 10083.—R. D., male, æt. eighteen, (Dr. Callan,) admitted Aug. 24, 1883. Has had gran. lids and pannus for three years. Under treatment only occasionally, and with only temporary benefit. Condition on coming in: Heavy masses of granulations on both upper lids, and pannus involving **entire** cornea, O. U.

Aug. 24th.—Began using jequirity. Four applications during day to everted lids, and bathing with same every hour.

Aug. 25th.—Lids swollen, tense, and hot. Some discharge of muco-purulent character. Membranes on both upper lids; corneæ hazy; atropia. Jequirity continued.

Aug. 26th.—Discontinued jequirity. Ice compresses; lids bathed hourly with sol. boracic-acid, and atropia t. i. d.

Aug. 27th.—Ophthalmia subsiding. Lids show improvement. Corneæ still hazy; very little pain; no discharge. Atropia and boracic-acid solution continued.

Aug. 29th.—Began boracic-acid pulv., dusted freely on everted lids once daily. Atropia t. i. d.

Aug. 30th.—Condition of lids much improved. Fewer granulations, and general surface smoother and thinner. Corneæ clearing; atropia t. i. d., and boracic-acid pulv. once daily on everted lids.

Sept. 4th.—Jequirity again begun. Four applications during day, and hourly bathings with the same.

Sept. 5th.—Sharp reaction. Jequirity discontinued. Ice compresses; lids bathed hourly with sol. boracic-acid, and atropia t. i. d.

Sept. 7th.—Inflammatory reaction subsiding rapidly; no discharge. Opens eyes a little and has no pain. Lids are much smoother, and all the larger vessels of pannus are destroyed. Dusted boracic-acid pulv. on everted lids. Atropia t. i. d.

Sept. 9th.—Condition of lids and pannus continue to improve. Lids touched with copper lightly. Atropia as before.

Sept. 10th.—Patient left Infirmary.

CASE 6.—Hosp. No. 9802. B. D., female, æt. thirty-eight, (Dr. Callan,) admitted Aug. 28, 1883. Has had gran. lids and pannus in O. D. for past two years. Has been treated with usual remedies, with some improvement. Condition on coming in: Abundant granulations, especially on upper lid; marked pannus of upper third of cornea.

Aug. 28th.—Jequirity applied to everted lids three times during day, and ordered to bathe lids hourly with the same.

Sept. 5th.—Use of jequirity has been continued for past week, with, however, no reaction. To-day began using a preparation of the bean made at Infirmary; three applications in the day, with hourly bathings.

Sept. 6th.—Sharp reaction; lids much swollen; considerable discharge, and some pain. Decided membrane on both upper and lower lids. Cornea, in region of pannus, slightly hazy. Atropia t.i.d., and sol. boracic acid to bathe lids every hour.

Sept. 8th.—Same treatment continued. Condition much the same. No other membrane, and cornea a little more hazy. Sol. boracic acid and atropia as before.

Sept. 9th.—Discontinued jequirity. Lids are very smooth and free from granulations; cornea still too hazy to note result. Cold compresses (ice) and sol. boracic acid every hour, atropia t.i.d.

Sept 11th.—Ophthalmia rapidly disappearing; cornea clearing fast. Atropia and sol. boracic acid, as before.

Sept. 13th.—Began using boracic acid pulv., dusted freely over everted lids once daily. Sol. boracic acid to keep parts clean, and atropia t.i.d.

Sept. 25th.—Discharged. Lids are smooth and free from granulations, and only one or two small vessels remain of the pannus. Boracic-acid pulv. has been used once daily.

CASE 7.—Hosp. No. 10427. J. D. male, æt., twenty-one, (Dr. Callan,) admitted September 3, 1883. Has had gran. lids and pannus for several years, for which he has been treated with little benefit. On coming in, his condition is as follows: Abundant, soft granulations covering upper and lower lids, and a dense pannus over **entire** cornea, O. U.

Sept. 3d.—Began use of jequirity this afternoon. Two applications, and lids bathed once every hour with the same.

Sept. 4th.—Slight reaction. Lids swollen moderately, and some muco-purulent discharge. Thin membrane on upper lids, O. U.

easily removed. Sol. boracic acid, to bathe lids hourly, and atropia t.i.d.

Sept. 6th.—Infus. jequirity discontinued for present. Cold compresses (ice), bathing with sol. boracic acid hourly, and atropia as before.

Sept. 8th.—Jequirity ophthalmia has entirely disappeared. Lids somewhat improved, though pannus remains as before using infus. Eyes bathed every four hours with sol. boracic acid, atropia t.i.d.

Sept. 17th.—An infus. jequirity, made by Infirmary druggist, was begun to-day, with a slight change in mode of using it. Instead of **bathing** lids, the infus. was **instilled** (½ doz. drops) hourly. Applications as before.

Evening.—Lids are now much swollen, considerable discharge, membrane on both upper and lower lids, and cornea hazy. Sol. boracic acid ordered to bathe lids once every hour, atropia t.i.d. Jequirity continued.

Sept. 18th.—Condition much the same. Corneal haziness increased. Swelling of lids somewhat less, as is also discharge. Treatment continued.

Sept. 20th.—Discontinued jequirity. Cold compresses (ice) hourly. Lids bathed with sol. boracic acid every two hours, and atropia t.i.d. Lids now found much smoother than before. Corneæ still too hazy to determine amount of improvement.

Sept. 23d.—All reaction has subsided. Lids entirely free from granulations, and corneæ entirely free from pannus in upper half, O. U. still a few vessels in lower segments. Began use of boracic acid pulv. to-day, dusting liberally over everted lids. Atropia t.i.d.

Sept. 27th.—Lids were gently touched with copper. Corneæ have improved steadily, now being apparently transparent in upper halves, and vessels of lower segments disappearing slowly.

Oct. 17th.—Patient discharged. Lids had been alternately touched with copper, and alum, and boracic acid pulv., since Sept. 27th. Treatment to be continued in out-door department.

Case 8.—Hosp. No. 1050 (Bellevue Out-Door Dept.), A. K., female, aged seventeen, (Dr. Mittendorf,) admitted Sept. 18, '83. Has had gran. lids and pannus for three years. Was treated at Bellevue Out-Door Dept. for two months before being transferred. Only slight improvement under copper and alum. Condition on coming in: Abundant granulations, soft and juicy, of

both upper lids, and pannus over both corneæ, very dense, great photophobia.

Sept. 18th.—Infus. jequirity applied three times during day, and instillations once every hour. Temperature was taken before using jequirity, indicating 98°.

Evening.—Severe reaction. Both upper lids very much swollen, hot, and painful, with considerable lachrymation and discharge. Membranes on both upper lids, and corneæ hazy. Temperature 99°. Atropia. Jequirity continued.

Sept. 19th.—Treatment continued. Condition same. Corneæ slightly more hazy, and discharge more profuse. Sol. boracic acid used to bathe lids every two hours, and atropia t.i.d.

Sept. 20th.—Discontinued jequirity. Lids much smoother, and free from granulations. Corneæ still hazy. Ice compresses constantly, and sol. boracic acid hourly. Atropia as before.

Sept. 23d.—Ophthalmia rapidly disappearing. Corneæ clearing, and patient can open eyes a little. Cold compresses, sol. boracic acid, and atropia continued.

Sept. 24th.—Boracic acid pulv. dusted over everted lids once. There are very few granulations remaining, and corneæ are free from pannus, except a few small vessels, at periphery in O. D. Atropia t.i.d.

Sept. 25th.—Discharged. Lids much improved, and promise speedy recovery. Corneæ clearing rapidly.

March 16, '84.—Patient seen to-day. Corneæ are perfectly clear. No remains of pannus, and very few granulations on lids. Has been under treatment regularly, in out-door department. Copper and alum have been used.

Case 9.—Hosp. No. 1069. W. D., Male, æt thirty-three, (Dr. Callan,) admitted Nov. 2, 1883. Has had gran. lids and pannus for several years—does not remember how long. Present condition: Heavy granulations, both upper and lower lids, O. U. and dense pannus over **entire** cornea O. U. No true corneal tissue visible. Great photophobia, and has to be led.

Nov. 2d.—Jequirity applied to everted lids freely three times during day, and **instillations** hourly.

Evening.—Lids much swollen, tense, and painful, with some discharge, and membranes on both upper lids. Atropia. Jequirity continued.

Nov. 3d.—Stopped using jequirity. Lids slightly improved. Pannus unaffected. Cold compresses (ice), atropia t.i.d., and sol. boracic acid every two hours.

Nov. 5th.—Inflammatory condition rapidly subsiding. Compresses, atropia, and sol. boracic acid continued.

Nov. 6th.—Boracic-acid pulv. dusted on everted lids, which are somewhat improved. Not so thick as before using jequirity. Atropia t.i.d.

Nov. 27th.—Boracic-acid pulv. had been used until to-day; but lids not improving much, determined to try again infus. jequirity. Three applications during day to lids, with camel's-hair pencil, and hourly instillations.

Nov. 28th.—Lids swollen, lachrymation, with slight muco-purulent discharge; membranes on upper lids; corneæ unaffected. Boracic acid sol. hourly, atropia t.i.d.

Nov. 29th.—Discontinued jequirity. Lids again improved. Thinner and smoother, but pannus very little changed. Ice compresses constantly, and eyes bathed every hour with sol. boracic acid. Atropia t.i.d.

Dec. 1st.—Ophthalmia has disappeared. Lids very gently touched with copper. Boracic acid sol. and atropia as before.

Dec. 20th.—Continued use of copper, alternating with boracic acid pulv., until to-day. Began again with infus. jequirity. Three applications during day to everted lids, and hourly instillations.

Dec. 21st.—Sharp reaction. Most severe yet. Lids much swollen, hot, and painful. On everting lids (which was very difficult) membranes were found in both upper and lower lids, as also on **ocular conjunctiva**. Corneæ hazy.

Evening.—Had continued jequirity for half the day. Then ordered ice compresses constantly, and sol. boracic acid hourly. Atropia t.i.d.

Dec. 22d.—Inflammation subsiding. Swelling much reduced. No discharge, no pain. Compresses (ice), sol. boracic acid, and atropia as before.

Dec. 23d.—Reaction nearly gone. Lids greatly reduced, and much smoother, and free from granulations, and pannus in both eyes vastly improved. Dusted liberally boracic acid pulv. on everted lids. Atropia t.i.d.

Feb. 8, 1884.—Discharged. Patient now able to walk about unassisted, and can bear the light well. Eyes open two thirds. Lids quite free from granulations, and pannus only at periphery of corneæ. Copper, alternating with tannin and glycerine (grs. xxx. to ℥ i), used since Dec. 23, 1883.

Case 10 (out-door patient).—G. R., female, æt. seventeen, (Dr.

Moore,) has had gran. lids and pannus for four years. Under treatment all the time, by usual remedies, with only moderate improvement. Condition at time of commencing use of jequirity: Lids abundantly granular and soft; pannus, upper half of each cornea. Slight loss of epithelium, near centre, causing ulcer.

Nov. 3, 1883.—Use of jequirity begun. Infus. applied with camel's-hair pencil to everted lids, and one instillation.

Nov. 4th.—Both lids now covered with membrane, and somewhat swollen. Infus. instilled twice by patient at home. Ice compresses, and sol. boracic acid to keep parts clean. Jequirity continued.

Nov. 5th.—Swelling increased, and membrane still present. Patient has general febrile disturbance, with a slight amount of nausea, and diarrhœa.

Nov. 6th.—Membrane now extends over **ocular conjunctiva.** Cornea hazy. Infus. still continued, twice daily, and parts kept clean with sol. boracic acid. Atropia t.i.d.

Nov. 8th.—Membrane still present, but much less in extent. Infus. discontinued. Ice compresses constantly, sol. boracic acid hourly, and atropia t.i.d.

Nov. 15th.—Lids smooth, and cornea much clearer, with great reduction of pannus.

Nov. 26th.—Corneæ entirely free from pannus, and lids smooth and free from granulations. Patient feels better than for several years, and is able to keep eyes open widely.

March 1, 1884.—Patient's condition now such that she can work and use her eyes daily with no inconvenience.

Case 11.—Hosp. No. 1325. W. McC., male, æt. fourteen (Dr. Mittendorf,) admitted Nov. 10, 1883. Has had gran. lids and pannus, O. U., for past two or three years. Present condition: Abundant granulations on both upper lids, and pannus covering both corneæ entirely. Has been treated with copper, silver (grs. v. to ℥ i.), and alum, but not regularly, and with little or no improvement.

Nov. 11th.—Jequirity applied four times a day to everted lids with camel's-hair pencil, and hourly **instillations** of infusion.

Nov. 12th.—Severe reaction followed in O. U. Lids much swollen, tense, and hot. Membranes on both upper lids, and corneæ slightly hazy. Discontinued jequirity. Ice compresses hourly, bathings with sol. boracic acid, and atropia t.i.d.

Nov. 13th.—Reaction from jequirity fading rapidly. Lids

found much improved, smoother, and thinner, and corneæ clearing slightly. Dusted a small quantity of boracic acid pulv. between lids once. Atropia as before.

Nov. 15th.—Lids were touched with copper lightly, cornea gradually clearing, and lids improving.

Nov. 20th.—Alternating now with copper and boracic acid pulv. Condition of lids and pannus much the same.

Nov. 27th.—Jequirity applied again four times during day, with hourly instillations.

Nov. 28th.—Lids swollen, lachrymation, pain, and some discharge. Membrane over both upper lids. Corneæ very hazy. Stopped jequirity. Ice compresses constantly, with sol. boracic acid hourly, to keep parts free from discharge, and atropia t.i.d.

Nov. 29th.—Swelling much reduced, and patient free from pain; no discharge. Lids much improved as regards thickness and smoothness, and corneæ clearing. Sol. boracic acid bathings every two hours. Atropia t.i.d.

Dec. 1st.—Began using to-day boracic acid pulv., freely dusted over everted lids. Condition of lids and pannus steadily improving.

Dec. 3d.—Alternating with copper and boracic acid pulv.

Dec. 5th.—A canthoplasty in O. U.

Dec. 7th.—Stitches removed, and lids gently touched with copper. Very few granulations remaining, and pannus rapidly disapearing, O. U.

Dec. 10th.—Patient able to face moderate light, and has improved wonderfully since canthoplasty.

Dec. 12th.—Discharged.

March 1st, 1884.—Seen to-day for first time in two months. Is now able to read and use his eyes with little or no inconvenience. Has been treated every other day in the out-door department. Lids very smooth, and corneæ entirely free from pannus.

CASE 12,—(out-door patient).—M. M., female, æt. nineteen (Dr. Moore,) has had gran. lids and pannus for six years. A canthoplasty has been done on both sides, and the usual remedies applied, with very slight improvement.

Nov. 13th, 1883.—Use of jequirity commenced in each eye. Two applications to everted lids. Patient instilled. Infus. twice at home.

Nov. 14th.—Membrane found in each eye, and lids hot and swollen. Cold sol. boracic acid every hour, to bathe lids. Jequirity continued.

Nov. 16th.—Membrane more extensive, and cornea more vascular and hazy. Treatment continued.

Nov. 18th.—Infus. discontinued, owing to activity of inflammation. Ice compresses constantly, lids bathed every hour with sol. boracic acid, and atropia t.i.d.

Nov. 25th.—Membrane has disappeared. Pannus in O. D. nearly all gone ; in O. S. about as at first. Sol. boracic acid and atropia as before.

Dec. 16th.—Right eye, the lids are smooth and free from granulations, and pannus **entirely** gone. Granulations in O. S. much reduced, as also pannus.

March 11, 1884.—Patient still under treatment for O. S., and is improving (mitigated stick).

CASE 13.—Hosp. No. 3732. M. C., male, æt. twenty, (Dr. Moore,) admitted Feb. 16, 1884. Has had gran. lids and pannus, O. D., for past year and a half. Pannus involving upper half of cornea. Present condition : Granulations abundant and firm, covering entire upper lids. Has been treated for some time past, but with no marked improvement.

Feb. 16th.—Jequirity applied to the everted lids with camel's-hair pencil four times during day, and instillations every hour.

Evening.—Lids much swollen, pain, lachrymation, and discharge; a well-defined membrane over upper lid, and cornea hazy ; atropia.

Feb. 17th.—Discontinued jequirity. Ice compresses constantly ; lids bathed every hour with sol. boracic acid, and atropia t. i. d.

Feb. 18th.—Reaction subsiding ; lids much improved, thinner, and smoother, and larger vessels of pannus destroyed. Sol. boracic acid and atropia as before.

Feb. 23d.—Began using jequirity again ; two applications in day and hourly instillations.

Evening.—Lids much swollen, tense, and hot, with slight discharge ; membrane on upper lid ; cornea hazy ; atropia.

Feb. 24th.—Jequirity discontinued. Ice compresses constantly, lids bathed hourly with sol. boracic acid, and atropia, t. i. d.

Feb. 26th.—Ophthalmia subsiding rapidly ; lids almost entirely free from granulations ; cornea clearing ; patient able to open eye ; no pain. Sol. boracic acid and atropia as before.

Feb. 27th.—Used boracic acid pulv., dusted liberally over everted lids ; atropia t.i.d.

Feb. 29th.—Lids touched gently with copper. Pannus gradually disappearing. Stopped atropia.

March 3d.—Condition of lids and cornea improving steadily. Alternating now with copper and boracic acid pulv.

March 19th.—A canthoplasty this morning, O. D. Lids bathed every two hours with cold sol. boracic acid.

March 21st.—Stitches removed, and boracic acid pulv. dusted liberally on everted lids. Granulations nearly all disappeared, and cornea almost entirely free of pannus—only one or two very small vessels at limbus. Copper and boracic acid pulv. alternately.

March 25th.—Pannus destroyed, and lids steadily improving.

March 28th.—Condition of patient improving daily.

March 29th.—Discharged cured. A few isolated granulations here and there on upper lid, and pannus entirely absent.

CLINICAL OBSERVATIONS ON THE USE OF JEQUIRITY IN TRACHOMA.

By H. KNAPP.

THE first publications of De Wecker on jequirity impressed me as being so remarkable and important, that I resolved to try the remedy as soon as further observations confirmed De Wecker's statements either wholly or in part. Such confirmations very soon appeared in different countries. In the United States it was Dr. E. Grüning who, in Feb., 1883, before the N. Y. State Med. Soc., first announced that he had tried the new remedy and had obtained most satisfactory results in two cases of inveterate trachomatous pannus. One thing in his and other accounts prejudiced me against the remedy: the *white color* which was left on the inner surface of the lids. This, I feared, meant that the mucous membrane had been destroyed and replaced by connective-tissue. If we had to take cicatrices into the bargain, thought I, the remedy was not superior to the different modes of cauterization, and in that case I would prefer to cure trachoma by sulphate of copper more slowly but with less scars. Yet the visual results from jequirity were stated to be so excellent, that I resolved to give the remedy an extensive and systematic trial.

To bring out its effects and test its advantages over the older methods of treatment I determined from the beginning to treat one eye of each patient according to the old method, the other with jequirity.

During the summer of 1883 I used the jequirity infusion such as De Wecker had first recommended, on dozens of patients, both in hospital and dispensary practice. The

infusions were used fresh or one or two weeks old. They were repeatedly brushed over the everted lids three times a day and oftener, and compresses, kept moist with them, were placed on the lids the whole day or the greater part of it. All the reaction I obtained from this treatment was moderate swelling of the lids, increased congestion, and more or less muco-purulent discharge with here and there some whitish patches loosely adherent to the conjunctiva. Two cases may serve to illustrate this period of my experience with jequirity.

CASE 1.—Mrs. K. W., æt. sixty-five, of this city, had trachomatous pannus of both lids, denser in the right than in the left eye; S R $\frac{8}{200}$, L $\frac{8}{200}$. Conjunctiva of upper lids atrophic. Admitted to hospital July 13th. Left eye treated with bluestone daily, the *right* with jequirity in the manner just described. July 16th.—Jequirity apparently has no effect whatever; there is a little more secretion, but no swelling, and no membrane; cornea the same. 19th.—No change whatever. 21st.—The left eye is slowly clearing; S $\frac{7}{200}$. 26th.—Applications of jequirity continued without effect. Aug. 6th.—S R $\frac{8}{200}$, L $\frac{20}{200}$; pannus much less in left, in right no perceptible change.

CASE 2.—Jennie G., æt. fourteen, New York. Admitted to hospital, June 5, 1883. Both lids swollen and succulent, with a few whitish scars; dense pannus, more in R. than in L. eye. R S $\frac{8}{200}$, L $\frac{6}{200}$. R. treated with jequirity. June 6th.—Moderate swelling of lids, no membrane, puriform secretion. The next day some gray patches on inner surface of upper lid; more secretion. June 13th.—Eye clearing, improved; the left has improved under copper treatment. July 16th.—Slight relapse in left eye. July 25th.—Both eyes alike; scars on upper lids. S $\frac{8}{200}$ in each. Further treatment of both with copper in dispensary.

Tired of the uncertainty of the action of weak infusions, I asked the druggist to prepare a stronger solution of beans as fresh as he could have them. He sent me a five-per-cent. infusion, (made of five grms. of the husked and ground beans, macerated in one hundred grms. of cold water twenty-four hours). Infusions of this strength, which I then used for six months, invariably and promptly produced the characteristic jequirity ophthalmia. The following cases will show the results:

CASE 3.—T. B., aged fifty, shore laborer, trachoma four years; frequent relapses, which always improved quickly under copper-treatment. Admitted Aug. 27, 1883. A new relapse with dense pannus in upper halves of corneæ; a small superficial ulcer in centre of left; S R $\frac{20}{200}$, L $\frac{10}{200}$. Five-per-cent. infusion of jequirity brushed, upon conjunctiva of *left* upper lid, 3 times daily for three days; swelling of lids, lachrymation, sero-purulent discharge, heat, pain, fever marked. A dense diphtheritic membrane covered both upper and lower conjunctivæ. Cornea very opaque, uneven; epithelium swollen; pupil not discernible. S $\frac{1}{8}$. Remedy discontinued. Careful cleansing, bathing with cold water, atropine. The symptoms abated quickly, the cornea cleared up, the ulcer healed, but the sight, when the patient left the hospital, in two weeks, was only $\frac{3}{200}$; in the right, which had been treated with copper, it was $\frac{8}{10}$. Patient returned several times; the left eye cleared up still, but its *sight remained worse than that of the other.*

CASE 4.—Joseph S., aged twenty-nine. Right-eye trachoma for a year, improved and almost cured by copper-treatment several times; always relapses. Admitted Aug. 29th. S $\frac{15}{200}$. Cornea diffusely hazy, almost without blood-vessels. Tarsal conjunctiva succulent. Five-per-cent. jeq. inf. brushed over it four times in twenty-four hours. Reaction pronounced; quickly diminishing on second and third days. Application repeated on fourth. Croupous membranes on upper and lower lids. Cornea opaque and very vascular. One application on fifth day. S $\frac{1}{8}$. Eye very painful during night. Inflammation subsiding quickly. Discharged Sept. 10th. Cornea clearing. Nov. 14, 1883.—Lid thin, mucous surface smooth and pale, horizontal depressed scar near edge of lid. Cornea clearing. S $\frac{15}{200}$. *Result of treatment in ten weeks: Trachoma of lids cured with formation of scars as usual. Sight has remained the same.*

CASE 5.—J. N. J., aged thirty-one; Kansas; painter. After wiping with a towel of another man who had "the eye disease," his right eye swelled and discharged. Cleansed with a spray six weeks, treated with copper the last nine months. St. pr. Pannus, dense in upper part; inner surface of upper lid red, uneven, succulent. Admitted to hosp. Oct. 4th. S = $\frac{5}{200}$. First treated with bluestone; the improvement, though distinct, not being rapid enough for the patient, who wanted to return to his home as soon

as possible, a five-per-cent. jeq. inf. applied three times on Oct. 25th, twice on Oct. 26th, followed by considerable swelling, pain, some chemosis ; conjunctival surface covered with a whitish adherent membrane; cornea dull. No more applications. Oct. 29th. —Swelling less, membrane separating. Nov. 1st.—Lids succulent, smoother ; cornea still dull, but clearing. Nov. 6th.— Swelling gone, density of pannus diminishing, blood-vessels thinner. Discharged, Oct. 8th.

Dec. 10th.—Upper lid somewhat congested, but free from granulations ; in centre of tarsus, near reflexfold, some cicatricial tissue ; cornea much clearer, with one or two very thin blood-vessels. S = $\frac{20}{100}$.

Resumé: Trach. pannus, of one year's standing ; under copper improvement slow, under jequirity rapid cure with cicatricial tissue on tarsus. S improved from $\frac{5}{200}$ to $\frac{20}{100}$.

Case 6.—J. W., æt. twenty-two ; city. Follicular trachoma, treated with copper sixteen months, at first rarely, for there were only a limited number of spawnlike granulations, and patient was careless, not observing hygienic directions. Constant relapses at first at longer, then at shorter intervals. From Nov., '82, more or less constantly treated (as an office patient) ; granulations very numerous, confluent at upper fornices; dense pannus. Then in hospital three weeks, treated with copper ; left greatly improved. In spring, '83, relapse with pannus ulcerosus. In summer treated daily in Catskills, for three weeks ; great improvement.

Relapse in Sept., '83. Treated with jequir. five-per-cent. inf., R. eye only ; brushed on once daily for three days. Great swelling of lids, pain, fever, prostration ; croupous deposit on conjunctiva ; sero-purulent discharge. Gradual improvement. Relapse of trachoma and pannus ulcerosus in five weeks ; treated with copper.

In the other (left) eye the whole upper fornix densely studded with spawnlike granulations ; cornea opaque, with superficial ulcers ; S = $\frac{5}{200}$. Oct. 24th.—Five-per-cent. inf. of jeq. brushed over everted upper lid once daily, for three days ; reaction prompt. Great pain and general disturbance, especially at night. Cornea opaque and vascular, in its centre a ring-shaped infiltration. Applications discontinued. Later he had in right two, in left one repetition of jequirity inoculation. Gradual subsidence of inflammation.

Nov. 28th.—Granulations have diminished steadily, but are still very numerous and corneæ opaque. S = $\frac{5}{200}$. A fifty-per-cent.

solution of boro-glyceride in glycerine spread over upper fornices every other day; at first causing violent burning, afterward well borne. In several weeks the eyes touched regularly with sulphate of copper crystal. Gradual disappearance of granules, shrinkage of conjunctiva, superficial white, cicatricial tissue; corneæ clearing up. At present, April 2, '84, R. conjunctiva free from granulations, shrunken, still red in fornix portions. Corneæ tolerably clear. L. still some granulations. S R $\frac{20}{50}$, L $\frac{20}{100}$; reads finest type. Eyes feel comfortable.

Résumé: Acute pannus, neglected, growing steadily worse, at times improved by care and copper treatment. Many relapses. Jequirity diminished granulations and pannus; patient objected to further repetitions on account of the temporary great general prostration caused by the treatment. Gradual cure of granulations by copper, leaving a shrunken conjunctiva. No inversion of lids. S tolerably good in right, moderate in left eye.

Case 7.—C. R., Brooklyn, æt. sixteen. Admitted to hospital Nov. 22d, treated with copper. Both corneæ bright, but the conjunctiva of both eyes, especially upper fornices, densely studded with spawnlike granulations. Both eyes alike.

The left conjunctiva brushed over with five-per-cent. jeq. inf. four times on Nov. 29th, and once more in the morning of Nov. 30th. The lids swelled, were painful, and in the evening a croupous membrane had formed upon them.

Dec. 1st.—He did not sleep the whole night, eye almost totally closed, lids cannot be everted; dense yellowish membrane adheres to both.

Dec. 2d.—No sleep at night; swelling diminished. Dec. 4th.—Inner surface of lids still covered with whitish membrane, which cannot be removed. Dec. 7th.—Membranes disappearing from lower lid. Dec. 12th.—Lower lid smooth and succulent, only a few granulations left; upper lid studded with them. Dec. 14th.—Membrane totally disappeared from upper lid, fornix much swollen.

Dec. 19th.—Jequirity reapplied three times to upper lid. The same reaction as before, though less intense. Dec. 24th.—Membrane well marked; Dec. 29th, gone again; lower lid smooth, but the granulations persist in upper.

Disch., Jan. 9, '84.

In the course of several weeks they disappeared however; the whole conjunctival surface was smooth and pale red, as if covered with very thin white tissue paper. The palpebral fissure was

smaller, and the lids opened less than those of the other eye, and there was a certain degree of lachrymation.

The other eye had been daily touched with the copper crystal. There was a steady diminution of the granulations. This treatment is kept up three times a week even now, April 2, '84, though the granules have disappeared. The fornices are still slightly swollen. There is neither contraction of lids, nor scars, nor lachrymation.

Résumé: Follicular trachoma of both lids of both eyes, very extensive; corneæ clear. One eye cured with jequirity, intense local and general reaction; one repetition in three weeks producing the same effect, though milder. Cured in two months, with contraction of lids, superficial uniform cicatrization of conjunctiva, and lachrymation. The other eye cured in five months without cicatrization and its consequences. Corneæ never affected in either.

CASE 8.—R. J., æt. nineteen, New York. Noticed that right eye was inflamed three weeks. Touched by another physician with copper. No relief. I treated him in the same way for two weeks. No marked improvement. Nov. 28th, '83.—The upper lid of right eye densely studded with spawnlike granulations, the lower less. Cornea clear. Jeq., five-per-cent. infusion, brushed over both lids of right eye in the morning and evening.

Nov. 29th, 9 A.M.—Marked swelling and chemosis. Croupous membrane on both fornices, removed from lower; granulations distinct. Jeq. brushed over upper and lower lids. 7 P.M.—Very great swelling and redness. Constant serous, whitish discharge. Lids stiff, can not be everted. Pain. Cornea clear. Medicine discontinued. Inflammatory symptoms disappear.

Dec. 20th.—The lower fornix the only part free from granulations; the upper still thickly studded with them, though they are smaller. Jeq. brushed over the tarsus of the lower lid and the whole conjunctiva of the upper, once daily for three days. Reaction marked. The last remnants of the membrane on upper lid disappeared after twelve days. Thin and yellowish granulations on left. They disappear gradually in four weeks, and the whole conjunctiva looks healthy; no lachrymation.

The other eye was but slightly affected, and was easily cured with copper.

Résumé: Follicular trachoma very extensive in one eye, completely cured in two months with jequirity; one repetition in three weeks. Cornea not affected. The other eye mild trachoma, speedily cured with copper.

The foregoing case was the most satisfactory of all that I have treated with jequirity, the following is the most unsatisfactory. Both were treated as out-patients; the former being a private, the latter a dispensary patient.

CASE 9.—M. G. W., æt. ten, New York, came to dispensary with extensive follicular trachoma in both lids of both eyes. Both corneæ clear. There was no notable discharge. The left was inoculated with jeq. (five per cent.) brushed over lids every other day. The lid swelled, purulent discharge set in, and after the third application the other eye was infected without having been treated with jequirity. The remedy was left off and cold application and cleansing were ordered. Though the inflammation in both was intense, I thought it was owing to the jequirity, and did not apprehend any danger. When the child came again, three days later, the eyelids were so much swollen, immovable, and painful, and the discharge so marked, that I opened the lids with an elevator to inspect the corneæ. To my great terror I found the left cornea white, infiltrated as in croupous conjunctivitis (see these ARCH., vol. xi. p. 1), and in the right a deep but clean central ulcer. I at once admitted the child to the hospital, treated her with iced applications, day and night, and careful cleansing, as if it were a case of diphtheria. Both eyes soon improved; the corneæ perforated; the ulcers healed with a small adherent, not quite central leucoma, but otherwise clear corneal tissue and good sight. She was in the hospital five weeks. The granulations were cured without much cicatricial tissue.

Résumé: A child with clear corneæ and extensive follicular trachoma was treated with jequirity in one eye, five-per-cent. infusion. The discharge became purulent, and after the third application the other eye was affected. Both corneæ perforated, but the disease was cured in each, leaving small adherent leucomas with good sight.

These cases had convinced me satisfactorily that a five-per-cent. infusion of jequirity has a positive effect on the ocular conjunctiva, that it cures granulations, but that it is not dévoid of danger.

During the last four weeks I have treated a number of cases according to the method which De Wecker describes in his latest communication (this volume, above), viz., a three-per-cent. infusion, freshly prepared, the maceration

lasting only three or four hours. The effect of this infusion is less intense and when applied only once a day, the croupous membrane is not always produced, and is often very superficial and defective. Yet I have obtained some good results from it, even after so short a trial. The following case is a brilliant illustration.

CASE 10.—H. C., æt. seventeen; city. Trachoma began two years ago. Pannus in upper half of left cornea well developed (many blood-vessels, but opacity slight), lower part less affected, but also somewhat vascular and infiltrated. Fornix of upper lid studded with a multitude of spawnlike granulations, coalescing at the posterior part. S = $\frac{8}{200}$. March 18, 1884, jequirity (3 %, three hours maceration) made in the forenoon, applied in the afternoon by brushing three or four times thoroughly over everted upper lid. March 19th, considerable swelling of upper lid, profuse lachrymation, pain, cornea duller; inner surface of lids, especially the fornix of the upper, covered with a croupous membrane. March 20th, swelling somewhat less; membrane still adherent. March 21st, membrane separating. March 23d, lids smoother, but cornea still dull and covered with blood-vessels. Patient discharged, March 24th. March 28th, fornix of upper lid smoother, but still infiltrated. Cornea much clearer, blood-vessels greatly shrunken. S = $\frac{20}{100}$. Jequirity has to be repeated once more.

Résumé.—Old follicular trachoma with pannus. One application of a three-per-cent. infusion produces a moderately intense jequirity ophthalmia; reaction over in six days. Granulations diminished, cornea clearer. Sight raised from $\frac{8}{200}$ to $\frac{20}{100}$ in ten days.

Concluding Remarks.—The foregoing pages show that jequirity is a most valuable remedy for granular conjunctivitis, yet not to the exclusion of all others. Mild forms of acute granulations yield quite frequently and readily to touching with sulphate of copper, and many cases of chronic trachoma which have been treated in the dispensary or office for months and years, are rapidly improved when admitted to the hospital. Of this fact I have satisfied myself in hundreds of instances. There are, however, a certain number of cases that have proved rebellious to all kinds of treatment known before the introduction of je-

quirity. We may infer from our present experience, limited as it still is, that at least a certain percentage of that number will be amenable to the jequirity treatment.

Jequirity cures trachoma in a shorter time than sulphate of copper, but it may, in so doing, also produce a greater destruction of tissue, and act more like the stronger caustics, mitigated or pure stick of nitrate of silver, etc. The destruction of mucous membrane and its replacing by cicatricial tissue appear to me, at present, as at first, the most dangerous effects of the new remedy. How far they can be controlled will be seen in future. It appears to me that the more intense the jequirity action the denser the pseudo-membrane; the more it penetrates into the tissue the greater is the destruction of the mucosa and the formation of scars. Such intense reactions are much more akin to diphtheria than croup. Croup of the conjunctiva is essentially a hypertrophic, diphtheria a destructive, process. (See my paper on croup of the conjunctiva, these ARCHIVES, xi., p. 5.) A mode of applying jequirity, which is both active yet not destructive, bids fair soon to be found. The five-per-cent. maceration for twenty-four hours, applied several times daily and for several days in succession, is decidedly too strong. A three-per-cent. infusion is for some cases too weak, but may be used to test the susceptibility of the patient. With it, brushed once over the everted lids, the treatment may be begun, and, according to the reaction, it may be continued or made stronger. From a single application of a three-per-cent. infusion scarcely any danger is to be apprehended. (See supplement at end.)

The treatment should be interrupted as soon as the pseudo-membrane is formed. The effect of the application will come out fully in several weeks. If, then, there is no further improvement, and the granulations are still present, a repetition is indicated. A repetition may be made at a shorter interval, if the reaction be slight. In any case, I would warn against too strong an effect of the remedy so that, as far as possible, the formation of scars may be avoided even if they be so superficial as in our case 7.

The danger of ulceration and destruction of the cornea,

though real, may, I think, be controlled by watching the patient every day, discontinuing the remedy as soon as its primary action becomes too intense, or the discharge purulent. I think it unsafe to push the effect of the remedy so far that the lids become hard and immovable, for an inflamed immovable lid is always a danger to the cornea. When the lids have assumed this condition, especially when purulent discharge and corneal ulcers appear, the patient should, under all conditions, receive the greatest care and attention, either at his home or, better still, the hospital,—I mean a well-conducted and fully equipped and supplied institution. He should be treated as a case of blennorrhœa or diphtheria; the lids gently and frequently parted, and the conjunctival sac cleansed with a mild saline solution. As the jequirity ophthalmia is self-limiting much more than any other, and commonly begins to subside as soon as the remedy is left off, a watchful physician will be spared such unpleasant surprises as occurred in our case 9. (See supplement.)

Trachoma with a clear cornea may fairly be treated with jequirity, if the above-mentioned precautions be taken. Several of our cases belonging to this kind, have proved great successes. How far corneal ulcers permit the application of the remedy, I am from my present experience not prepared to state. I would make experiments in this direction with great caution. In case 3, where there was a corneal ulcer, the jequirity treatment rather aggravated the condition. I have no experience in the use of jequirity for other affections than granulations, but from DeWecker's recommendation of it for parenchymatous opacities of the cornea and other indolent conditions a still larger field seems to be opened for this remedy.

As to the value of jequirity in trachoma, when compared with other remedies, I would like to possess a greater number of parallel observations before I venture upon a positive assertion. Sulphate of copper has cured cases more slowly, but also with less scars than jequirity. Jequirity, when its effect is cautiously pushed, may bring about recovery without noticeable cicatrization, as our case 8 shows.

I shall continue to make comparative experiments—*i. e.*, to use jequirity in one eye, and another remedy in the other, under conditions as similar as possible. We all know the fact how capricious a disease trachoma is, getting well in some cases so speedily and completely that we almost doubt the correctness of our diagnosis, and in other cases resisting all kinds of medication, marching continuously or by innumerable relapses toward atrophy of the conjunctiva, with its disastrous effects on lid and cornea. If one eye of a case of either group is treated with copper, the other with jequirity, the inherent tendencies of the case will tell on both remedies.

Though I wish to limit the present communication to a statement of my clinical experience with jequirity, I will not conclude without mentioning that I consider the introduction of jequirity into the scientific world as an event of, as yet, incalculable importance. To what discoveries a remedy may lead with which, for the first time, we have been able artificially to produce an infectious disease, nobody can foretell, but what a blessing it will be to mankind if it cures trachoma, if only a little better than other remedies, thousands will appreciate who know what a widespread and rebellious affliction trachoma is.

Supplement. — While the foregoing paper was going through the press, two of the cases which were treated according to DeWecker's last directions (one brushing of a fresh three-per-cent. solution, macerated three hours, over everted upper lid) were followed by a most intense reaction: membranes marked, and when, three days later, they were cast off, a most violent pyorrhœa followed, which in two days affected the other (not inoculated) eye. In both corneæ of one patient extensive central perforative ulcers; the corneæ of the other case free thus far. Both patients were treated in the hospital; the first, in which the corneæ perforated, had ordinary trachomatous pannus, no discharge, no corneal ulcers; in the other the corneæ were but slightly opaque.

These cases, which were under my daily supervision at the hospital, presented, after one mild jequirity application,

a picture *identical with acute diphtheria of the conjunctiva in all its disastrous features.* Making due allowance for the depressing influence of this sad observation, I must confess that it has greatly lowered my expectations of the future of jequirity. What has occurred in my practice—now in three cases—may occur in the practice of others. I regard it as my duty to add this supplement to my paper, and shall report more fully on these cases in a future number of the ARCHIVES.

For the present my experience may be summed up as follows:

1. Jequirity cures trachoma more quickly, but less safely than other remedies.

2. Its action is highly beneficial in most cases, but neither uniform nor always controllable.

3. The cure of trachoma by jequirity as well as by nature and other remedies, is accompanied by more or less atrophy of the conjunctiva and the formation of cicatricial tissue.

4. The greatest danger from the use of jequirity consists in the occasional development of a severe diphtheritic conjunctivitis followed by pyorrhœa and more or less extensive destruction of the cornea.

5. The use of jequirity ought to be restricted to cases of old, intractable pannus, until cautious experimentation has determined the conditions under which we can obtain the benefit of this powerful remedy divested from its danger.

THE INFUSION OF JEQUIRITY IN GRANULAR LIDS AND PANNUS.

By Dr. EMIL GRUENING.

SHORTLY after the publication of De Wecker's first article on the action of jequirity in granular lids and pannus (1882), I began to treat a number of pertinent cases with an infusion of the abrus seeds. This infusion was prepared from old Jamaica seeds and had a strength of .3 per cent. ($\frac{3}{10}$ per cent.) (Wecker's first formula). The results were negative. Thinking that the staleness of the bean might have caused the failure, I procured a fresh supply and treated two cases (four eyes) of chronic granular conjunctivitis and total pannus with an infusion of the same strength. Here the results were highly satisfactory, the jequirity inflammation promptly appearing and leaving on its departure a clear cornea. An account of these cases was published in the *New York Medical Record*, March 17, 1883.

Since that time eighteen additional hospital cases and a greater number of out-door patients have been treated by me with the infusion of jequirity.

Here, I shall report only such cases as were under my personal observation in the German and Mt. Sinai hospitals during the whole term of treatment.

In the subjoined list the conjunctival and corneal conditions, the strength of the infusion, its mode of application, its local and general action, the duration of treatment, and the immediate and final effects, are tabulated.

Number of Patient.	Name.	Number of Eyes.	Sex.	Age.	Condition of Conjunctiva.	Condition of Cornea.	Strength of Infusion.	Mode of Application.	Local Action.	Distant Action.	Duration of stay in Hospital.	Immediate Results.	Final Condition of Patient.
1	H. B.	1 R. 2 L.	M.	55	Chronic granular conjunctivitis. Partial xerosis of palpebral conj.	Dense total pannus.	.3 % Wecker's first formula.	Brushed upon conjunctiva of upper and lower lids three times a day. Compresses moistened with the infusion day and night for five days.	Œdematous swelling of lids; lachrymaton formation of dense membranes in the substance of the conjunctiva.	Frontal headache; loss of appetite and sleep.	14 days.	R. cornea clear. L. cornea clear.	R. E. cured. L. E. cured.
2	M. L. L.	3 R. 4 L.	F.	10	Chronic granular conjunctivitis. Partial xerosis of conjunctiva. (Canthoplasty and syndectomy had been performed on both eyes.)	Dense total pannus.	.3 % Wecker's first formula.	Brushed upon paipebral conjunctiva three times a day for five successive days.	Œdematous swelling of lids; lachrymaton; dense membrane in substance of palpeb'al conjunctiva.	None.	14 days.	R. cornea clear; no granulations. L. one large vessel remains in cornea.	R. E. cured. L. E. improved.
3	Th. F.	5 R. 6 L.	F.	41	Acute granular conjunctivitis.	Clear.	2 %	Brushed upon conjunctiva of upper and lower lids three times a day for four days.	Œdematous swelling of lids; dense membranes in substance of conjunctiva.	Headache; loss of appetite.	30 days.	Granulations coalesced into raised patches.	R. cured with formation of raised cicatrices. L. cured.

4	H. F.	7 R. 8 L.	M.	9	Acute granular conjunctivitis.	Clear.	2 %	Brushed upon conjunctiva twice daily four days.	Œdematous swelling of lids; thick membrane in substance of conjunctiva.	None.	45 days.	Not improved.	R. not improved. L. not improved.
5	L. E.	9 R.	F.	20	Acute granular conjunctivitis.	Clear.	2 %	Brushed twice daily upon palpebral conjunctiva five days.	Lids swollen and hard; membranes thin, lying on the conjunctiva.	Headache; supraparotid gland swollen.	15 days.	Not improved.	Cured with formation of raised cicatrices.
6	I. G.	10 R. 11 L.	M.	34	Xer'sis parenchymatosa conjunctivæ palpebral is.	Dense total pannus.	2½ %	Twice daily brushed upon conjunctiva, thirty days.	Scanty blennorrhoic discharge. No membranes.	None.	44 days.	R. E. cornea clear. L. E. one large vessel remains in cornea.	R.E.cured. L. E. improved.
7	M. D.	12 R. 13 L.	F.	26	Xerosis parenchymatosa conjunctivæ. Symblepharon posterius. Trichiasis.	Dense total pannus.	2½ %	Instillation twice daily ten days; repeated three times during stay of patient in hospital.	Dense membranes formed.	Headache.	120 days.	R. E. cornea clear. L. E. large vessels remain in dense cicatricial tissue.	R.E.cured. L. E. improved.
8	J. M.	14 R.	M.	13	Partial xerosis of conjunctiva. A few granulations. Peritomy had been performed.	Dense total pannus.	2½ %	Instilled into the eye three times a day, three days.	Thin superficial membranes.	Headache; loss of appetite; vomiting; sleeplessness.	21 days.	Cornea perfectly clear. Cured.	Relapse; dense pannus six weeks after discharge.
9	J. C.	15 R. 16 L.	M.	40	Xerosis conjunctivæ.	Total pannus.	2 %	Applied to lids with br'sh three times daily, four days. Five repetitions of this treatm'nt.	Thin superficial membranes.	Left hemicrania.	54 days.	R. cornea slightly vascular. L. cornea slightly vascular and infiltrated.	Improved. Improved.

Number of Patient.	Name.	Number of Eyes.	Sex.	Age.	Condition of Conjunctiva.	Condition of Cornea.	Strength of Infusion.	Mode of Application.	Local Action.	Distant Action.	Duration of Stay in Hospital.	Condition when Discharged.	Final Condition (two months later).
10	R. A.	17 R. 18 L.	M.	15	Chronic granular conjunctivitis.	Clear.	5 %	Brushed upon conjunctiva twice daily, three days.	Lids hard and swollen; firm membranes in substance of palpebral and ocular conjunctiva; infiltration and ulceration of right cornea.	Violent headache; rectal temp., 103°.	30 days.	Not improved; corneal ulcer healed, leaving a macula.	R. E. not improved. L. E. not improved.
11	T. L.	19 20	M.	25	Xerosis parenchym. Symblepharon posterius.	Dense pannus.	2½ %	Brushed upon conjunctiva four times a day for four successive days; one repetition of treatment.	Lids swollen; dense membranes formed in substance of cicatricial tissue of conjunctiva.	Headache.	30 days.	Cornea clear.	R. E. cured. L. E. cured.
12	P. G.	21 22	M.	50	Chronic granular conjunctivitis.	Partial pannus (upper halves of both corneæ infiltrated).	5 %	Brushed only once upon the conjunctival surface of upper and lower lids.	Swelling of lids; dense membranes in substance of ocular and palpebral conjunctiva; ulceration of lower half (clear) of right cornea.	Headache; epiparotid glands swollen; asomnia.	30 days.	Both corneæ clear.	Two m'ths later the pannus had returned in both eyes.
13	J. W.	23 24	M.	20	R. E. conj. granulosa chronica; L. E. conj. granulosa chronica.	R. E. partial pannus; L. E. total pannus.	2 %	Brushed twice daily upon conjunctival surfaces of lids for five successive days.	Dense membranes formed.	None.	28 days.	Right cornea clear; L. E. two large vessels still visible; granulations as before.	Cured (cornea). Improved (cornea).

								days.			fore.		
14	H. S.	25 26	R. L.	M.	35	Conjunctivitis granulosa chronica.	R. E. partial pannus, upper half; L. E. partial pannus, upper half; small circular ulceration.	5 %	Brushed twice daily upon palpebral conjunctiva for two successive days.	Dense membranes formed.	None.	15 days.	Cornea clear; the granulations have not disappeared.	R. E. cured; *i. e.*, cornea clear. L. E. cured; *i. e.*, cornea clear.
15	L. H.	27 28		M.	42	Xerosis conjunctivæ.	Dense total pannus.	2½ %	Instilled four times daily, three days; two repetitions.	Sero-purulent discharge; no membranes.	None.	28 days.	R. cornea clear, L. cornea still granular.	Cured. Improved.
16	C. W.	29 30		M.	14	Conjunctivitis granulosa acuta.	Clear.	2½ %	Brushed upon palpebral conjunctiva four times daily, five days; compresses all day.	Dense membrane.	Headache; temp. 102°; epiparotid glands swollen.	30 days.	R. E. granulations unimproved; L. E. granulations coalesced into large patches.	R. E. not improved. L. E. not improved.
17	C. V.	31 32		M.	10	Conjunctivitis granulosa acuta.	Clear.	2½ %	Brushed upon palpebral conj. twice daily five days	Swelling of lids; dense membranes in substance of conj.	Epiparotid glands swollen.	30 days.	Granulations not improved.	R. E. not improved. L. E. not improved.
18	L. C.	33 34		F.	13	Conjunctivitis granulosa acuta.	Clear.	2½ %.	Brushed upon palpebral conj. twice daily five days	Swelling of lids; dense membranes in substance of conj.	Headache; vomiting; swelling of epiparotid (præ-auricular) glands.	30 days.	Granulations coalesced (raised patches).	R. E. cured; raised scars Semilunar fold drawn down by scar. L. E. cured; raised scars
19	C. D.	35 36		F.	8	Conjunctivitis granulosa acuta.	Clear.	2½ %	Brushed upon palpebral conj. twice daily five days	Swelling of lids; dense membranes in substance of conj.	Headache.	30 days.	Granulations coalesced into patches.	R. E. cured; with formation of raised scars in conjunctiva L. E. cured; do.
20	M. D.	37 38		M.	45	Conjunctivitis granulosa acuta.	Clear.	2½ %	Brushed upon palpebral surf. of conj. twice daily four days.	Swelling of lids; dense membranes in substance of conj.	Headache; sleeplessness.	21 days.	R. E. granulations disappeared; L. E. granulations disappeared.	Cured (no scars). Cured (no scars).

The conditions for which the jequirity was employed may be summed up under the following four heads:

I. Acute granular conjunctivitis with clear cornea.

II. Chronic granular conjunctivitis with clear cornea.

III. Chronic granular conjunctivitis with partial or total pannus.

IV. Xerosis of the conjunctivæ with total pannus.

In sections I. and II., acute and chronic granular conjunctivitis with clear cornea, I tabulated nine cases, seventeen eyes.

In these cases the use of the drug in two-per-cent., two-and-a-half-per-cent., and five-per-cent. infusions was uniformly followed by the characteristic local and distant symptoms and, in one case (five-per-cent. infusion), by a suspicious diphtheritic infiltration of the palpebral and ocular conjunctiva with ulceration of the clear cornea. The influence of the jequirity upon the granulations was variable. In eight eyes—and among them the two treated with the five-per-cent. infusion—the granulations persisted, in two eyes they disappeared leaving a smooth and apparently healthy conjunctiva, and in the remaining seven eyes they were transformed into ridges (corresponding to the rows of bead-like granulations) and patches, and finally into raised cicatricial bands. These cicatrices were very dense in case 17 and drew the semilunar fold out of place.

Under sections III. and IV., chronic granular conjunctivitis with partial or total pannus, and xerosis of the conjunctiva with total pannus, I recorded eleven cases, twenty-one eyes. Wherever, in these cases, pannus and granulations were associated, the pannus disappeared and the granulations remained. Of twenty-one infiltrated and vascular corneæ fourteen became clear, seven remained somewhat hazy. The infusions employed differed in strength: 0.3 per cent. ($\frac{3}{10}$ per cent.), two per cent., two and a half per cent., and five per cent. The five-per-cent. infusion was used in two cases, 12 and 14. In case 12 the first application had a violent effect. The lids became hard and painful and the ocular and palpebral conjunctiva appeared infiltrated with a white lardaceous material. In the

hitherto clear lower half of the right cornea a deep ulcer formed. The ulcer finally healed without leaving an opacity. At the expiration of four weeks the patient was discharged cured. Two months later he returned with a fresh crop of granulations and a new pannus.

In case 14 the five-per-cent. infusion produced moderate local symptoms and a good final result.

From these observations I derive the following propositions:

1. The use of a five-per-cent. infusion of jequirity is attended with danger to the cornea.

2. The action of the two-per-cent., two-and-a-half-per-cent., and five-per-cent. infusions of jequirity upon granulations is inconstant. The granulations are either not affected at all or are changed into dense cicatricial tissue. Their disappearance without conjunctival alteration is rare.

3. Jequirity acts more favorably than any other known substance upon the pannus accompanying or following the granular condition of the lids.

JEQUIRITY.

By Dr. C. J. KIPP, Newark, N. J.

MY experience with jequirity in granular conjunctivitis is not sufficiently extensive to entitle me to an opinion as to its value in this disease. In the cases in which I used it the granulation had already partly disappeared under the use of copper, and atrophy of the conjunctiva was marked. More or less opacity of the cornea, with or without vascularity, was present. I used a three-per-cent. solution of the jequirity, and applied it three times daily for three days to the conjunctiva of both lids with a brush, and had the same solution applied with compresses to the lids for five minutes after the application with the brush. Membranous deposit was developed on the palpebral conjunctiva only, and the swelling and increase of temperature of the lids were not very great. Constitutional disturbances were developed in each case. Some complained much of pain in the eye. The results were, on the whole, not satisfactory, and I have therefore not continued my experiments. The pannus was not diminished, and in one case the cornea is now, about four months after the application of the jequirity, much more hazy than it was before the trial. My patients state, however, that the eyes feel much better, as much of the roughness of the conjunctiva has disappeared. Inspection of the palpebral conjunctiva fails, however, to show any marked change in the condition of this membrane. I must confess that my experience, limited as it is, causes me to look upon this remedy as a dangerous one, as we are unable to control its effects.

JEQUIRITY—BY DR. H. W. WILLIAMS.

Boston, *6th March*, 1884.

Dear Doctor :

I have preferred to wait further trials of jequirity by others before employing it, believing as I do that trachoma and pannus can be more safely and as successfully treated by other means ; especially

if the patients can be admitted to hospitals, where they have the advantages of protection from injurious exposure, careful supervision, and proper and sufficient food.

Very truly yours,

HENRY W. WILLIAMS.

JEQUIRITY—BY DR. GEO. STRAWBRIDGE.

1500 WALNUT ST., PHILA., *April 10th.*

MY DEAR DOCTOR :

I am sorry to have to write that my assistant has mislaid the notes of all the jequirity cases that I had in Wills Hospital. We had full notes of them all, intending to publish them. He has hunted for them, but as yet cannot find them. There were perhaps twelve cases in my especial practice there, embracing cases of chronic granular conjunctivitis with pannus, also acute granular conjunctivitis, but *no* cases of corneal ulceration. We used the two-per-cent. solution, applying it twice daily for about six applications, or until a positive exudation appeared. Our general résumé is that it is a useful application for chronic granulations, especially in those cases associated with chronic corneal pannus. In fact the more chronic the inflammatory process the greater the benefit from its applications. In acute granular conjunctivitis I did not find it to be useful ; in fact, in several cases, the inflammatory process seemed to be increased. In one case there was a severe corneal suppurative process occurring two weeks after the application of jequirity had been stopped, so that I could not fairly say that it was a sequela of the treatment, especially as the case was of a strumous diathesis. I should be afraid to use the remedy in cases of acute corneal ulceration. I think that I can say as the result of the Wills Hospital experience that jequirity is adapted only to old granular conjunctivitis, where corneal pannus is also well developed. I am sorry about the notes, as I should have liked to have sent them to you.

Sincerely yours,

Dr. H. KNAPP, New York. GEO. STRAWBRIDGE.

JEQUIRITY—BY DR. WM. F. NORRIS.

1706 WALNUT ST., PHILA., *March* 5, 1884.

DR. H. KNAPP :

Dear Doctor—My experience with jequirity is not sufficiently extended or thorough to enable me to publish any thing on the

subject. My belief is, however, that it is so active a remedy that its use should be confined to the most inveterate cases of granular lids, where the cornea has long been completely permeated by blood-vessels.

Yours truly,

WM. F. NORRIS.

JEQUIRITY—BY DR. W. W. SEELY.

4TH ST. AND BROADWAY, CINCINNATI, *March 24th.*

TO EDITOR "ARCH. OPHTH.":

My Dear Dr.—Will you permit me for the present to put my "views" on "the jequirity question" in the form of a letter, as that would serve to be better adapted to what I have to say.

For several months we have been utilizing all trachomatous cases in my dispensary, and a few private ones, for testing the virtues of jequirity, a preliminary report of our results having appeared in the January number of *Zehender's klinische Monatsbl. f. Aughd.*, through one of my assistants, Dr. Tangeman.

My investigations have, perhaps, on the whole, taken rather a mixed form, in that they have never been in full, *à la* De Wecker, and in that we have used partly the ordinary domestic pea, in which are found the same sort of bacteria. In no case thus far of jequirity conjunctivitis have I seen any thing like a true *purulent inflammation*, simply a swelling of the lids and the formation of a croupous-like membrane, and yet a complete disappearance of the pannus and granulations has resulted. I do not now and never have regarded *purulency* as an essential factor in the cure; on the contrary, I think the more a remedy tends to excite purulency the more risk the eye runs, and hence the less general its applicability on this account. We have tried to avoid this extreme action of jequirity, and fortunately the first and perhaps the most brilliant case was one in which our painting of the lids with the infusion excited the membranous inflammation mentioned above, and nothing further was done with it, and yet with a resultant complete cure. This result justified my view that purulency had nothing to do with the relief, as it likewise justified the use of the remedy where the cornea was in a healthy condition.

In the beginning of our experiments Dr. Tangeman hit upon the same sort of bacteria in our domestic peas, as in the "Pater-

Noster Erbsen" (jequirity beans), and infusions of the former have in some cases acted admirably, with, however, a larger element of uncertainty, owing to its milder character.

Reports seemed to show conclusively that granulations could be made to disappear under the jequirity treatment, and my attention has chiefly been directed to determining how little inoculation was required and how to control its results. I find that the bichloride of mercury gr. i. ad ℥ i., the yellow oxide and vaseline, eserine and boracic acid,—in a word just the remedies I have long used for checking purulency,—answer perfectly. While some experiences would seem to point to our ability to dilute the jequirity infusion with the pea, so as to render the action of the former less intense, I await further experimentation to justify the statement. I have little to say about the *active* principle of the jequirity solution, though every thing seems to point to the peculiar bacteria as the exciting material, since the cultivated fungus acts in the same way, and since with the death of the bacteria the power to excite inflammation ceases.

It would seem that what takes place in the conjunctiva is the sterilization of the ground occupied by the trachoma fungus, by a very active but short-lived enemy, as the bacteria of the solutions, in particular those of the pea, soon disappear.

I have had the gratifying experience of seeing, in a shorter time than by any other process, a succulent conjunctiva thinned and permanently whitened by a single application of the jequirity, as also by the hourly use of the pea infusion continued for several days. While the short time I have used the jequirity and the limited number of cases prevent my asserting much, I can yet say I am thoroughly encouraged to follow up my investigations.

I believe I have perfectly demonstrated that by my so-called "non-astringent-caustic" (more properly parasiticidal) method (consisting of the yellow oxide of mercury and vaseline, as devised by myself; the bichloride of mercury gr. i. ad ℥ i.; and eserine when there are corneal complications), the trachomatous state can be set aside without the attendant risks of an "arznei-*krankheit*" (drug disease),—but I am aware of its shortcomings, and am prepared for any addition or substitution.

Very sincerely,

W. W. SEELY, M.D.

JEQUIRITY—BY DR. U. H. BROWN, SYRACUSE, N. Y.

I began the use of jequirity soon after my return from Paris in Nov., 1882, and have since continued the use of the remedy in cases where I thought it indicated, and with some restrictions as regards its employment. I see no reason in changing my published opinion [1] of its efficacy. I witnessed De Wecker's failure to excite the necessary purulence, with an *alkaloid* extracted from the beans, but was led to make use of a lotion prepared from the whole seeds by a letter which he wrote me, bearing date, Biarritz, Sept. 20, 1882, in which he spoke enthusiastically of the good results obtained from this preparation.

My recent experience with jequirity confirms De Wecker's statement indicating its use, as given in his letter to Warlomont,[2] viz.: that it is curative in cases of trachoma, and contra-indicated in papillary hypertrophy and follicular conjunctivitis.

My experience in the latter class of cases was not a happy one, as the remedy clouded the cornea in two instances, and in one case of chronic purulent ophthalmia a perforation of the cornea was undoubtedly produced by the lotion. In regard to the application of jequirity, I find that the "popular lotion" [3] answers all the requirements, but with perhaps a more frequent and freer use than at first advised. The lotion must be prepared from the sound beans, and should be applied as soon as possible after its preparation, as its beneficial effect is lost by long standing. I am inclined to believe that the negative results obtained from the use of the drug by Warlomont, Deneffe, Nicolini, and others, may be attributed to the neglect of this precaution. From my observations in upward of forty cases I would formulate the following conclusions:

1. The jequirity ophthalmia, if effective, is usually a painful one.

2. Jequirity is curative in the majority of cases of true trachoma.

3. Jequirity cures cases of scrofulous pannus, even when accompanied by ulcers of the cornea.

4. It is more efficacious in chronic than in acute cases.

5. It is contra-indicated in follicular conjunctivitis and papillary hypertrophy.

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[1] *Phila. Med. News*, April 14, 1883.

[2] *Ann. d' Ocul.*, March–April, 1883.

[3] Triturate sixteen well-pulverized seeds, and macerate them twenty-four hours in 250 grammes of cold water. The following day add 250 grammes of hot water. Filter the liquid immediately after cooling.

6. It is contra-indicated in corneal ulceration, unless accompanied by pannus and granulations.

JEQUIRITY—BY DR. J. F. HOTZ, CHICAGO.

My experience with jequirity extends over a period of nine months, during which time I have treated about 100 eyes presenting all possible phases and secondary effects of trachoma.

I have used two-, three-, and five-per-cent. infusions made with cold distilled water, or with a one-per-cent. solution of carbolic acid. I found the stronger infusions developed the typical ophthalmia quicker, but not to any higher degree, than the weaker infusions. The severity of the inflammation seemed to depend on the condition of the conjunctiva and on individual susceptibilities of the patients, rather than on the strength of the infusion.

The time of maceration varied from fifteen minutes to twenty-four hours; and I have not found the infusion of fifteen minutes, in any respect, less effective than that of twenty-four hours.

In regard to the frequency of applications (which were made with a camel's-hair pencil brushing several times over the everted eyelids), I have come to the conclusion that one application of a two-per-cent. infusion in twenty-four hours, produces the same effect as two or three applications per day, and that unsually two, seldom three, applications suffice to develop the severest possible reaction. This conclusion was obtained by treating one eye of a patient with repeated applications, and after its recovery treating the other eye of the same patient with one application per day. The effect in both cases was found identical.

The jequirity ophthalmia attained its greatest severity usually in forty-eight hours; it never failed to appear as long as there was any adenoid tissue in the tarsal conjunctiva. But in a few cases of extreme atrophy of the conjunctiva, jequirity produced no inflammation, though it was applied every day during a whole week.

The results of my treatment may be summed up as follows:

1. In fresh trachoma or in acute relapses, jequirity aggravated the inflammation.

2. Chronic cases with very succulent conjunctiva and abundant secretion (chronic blennorrhœa) were not benefited by jequirity.

3. But in chronic cases with a pale conj. and scanty secretion, the jequirity ophthalmia usually accomplished a speedy absorption of the granulations (papillary as well as follicular). The

conj. became thin and smooth ; sometimes, however, a slight simple conjunctivitis remained.

4. Though the cornea became dull and opaque during the acme of the inflammation, it never suffered any permanent injury, even where abrasions or ulcerations existed.

5. Acute vascular keratitis was not benefited ; pannus accompanying chronic trachoma quickly disappeared with the absorption of the granulations. But the most brilliant results the jequirity treatment attained, were in the clearing up of those forms of inveterate trachomatous pannus which we know to have been amenable to no other treatment save the inoculation of blennorrhœa or the peritomy. In such cases jequirity is undoubtedly the superior and preferable remedy ; it is safer than the inoculation, and quicker than the operation.

CHICAGO, *March* 15, 1884.

NOTICE.

The systematic report on the progress of ophthalmology belonging to this number will appear with that of the June number in our next issue. H. K.

MISCELLANEOUS NOTES.

We welcome and wish to draw particular attention to the following new publications :

1. The third volume of the **Transactions of the Ophthalmological Society of the United Kingdom** (Session 1882–1883). London, 1883. 313 pages, with eleven wood-cuts and fifteen beautifully executed lithographic and chromo-lithographic plates. The contributions are very numerous, free from prolixity, all instructive, and arranged in systematic order, very convenient for reference. The volume contains also a list of officers (Jonathan Hutchinson, President ; John Abercrombie and W. A. Brailey, Secretaries) and members, the rules of the Society, and an index. The Society, though young, is one of the most active and prosperous. It holds ordinary meetings, in London, from 8:30 to 10 P.M. on the second Thursday in October, December, January, March, and May, and on the first Thursday in June, and an Annual General Meeting on the Friday following the first Thursday in July.

The retiring president, W. Bowman, who was knighted some months ago, made the Society a donation of £1,000, for its scientific purposes.

2. The **Transactions** of the 19th Annual Meeting of the **American Ophthalmological Society,** New York, 1883. 172 pages, handsomely printed, with many illustrations. The numerous papers and discussions are mostly of a practical nature, and well worth reading.

3. The third edition, with numerous additions, of **E. Nettleship's** excellent, clear, and concise **text-book,** "The Student's Guide to Diseases of the Eye," London, Churchill, 1884, may be warmly recommended to the English and American student.

4. The first number of **"The American Journal of Ophthalmology,"** edited by **Adolf Alt,** M.D., St. Louis, Mo., published by J. H. Chambers & Co., St. Louis, Mo. The Journal will be issued on the 15th of each month at the price of $2.50 per annum. The present number—April 15th—contains, on thirty-two pages, eight papers which will be reviewed in our systematic report on the progress of ophthalmology. There is no doubt that the ophthalmological literary production of North America is extensive enough to supply several journals, and that a monthly periodical has the advantage of more rapid publication over a quarterly. From these reasons we trust that the new journal, whose editor is widely and favorably known to the profession by his writings, will not only be well supported, but serve as a stimulus to increased scientific activity among our brother oculists. If it succeeds to collect the ophthalmological articles scattered in too many general American medical journals, it will render a great service to the ophthalmic specialist without loss to the general practitioner, for we think that the chief object of general journals is to diffuse acquired knowledge, whereas the special journals should, above all, aim at advancing science.

The eighth session of the **International Medical Congress** will be held at Copenhagen, Denmark, from Aug. 10 to 16, 1884. The ophthalmological section promises to be well attended, for the International Ophthalm. Congress, which was to meet at Madrid this summer, has been postponed in favor of Copenhagen.

The **British Medical Association** will be held at Belfast, Ireland, from July 29 to August 1, 1884. There will be a section on ophthalmology.

The **American Medical Association,** will meet at Washing-

UofM

ton, D. C., on May 6, 1884. Dr. J. J. CHISOLM, of Baltimore, president; J. L. THOMPSON, of Indianapolis, secretary of the section on ophthalmology, otology, and laryngology.

The twentieth meeting of the **American Ophthalm. Society** will be held at Hotel Kaaterskill, Catskill Mountains, N. Y., July 16th and 17th this year. President: Dr. HENRY D. NOYES; Secretary, Dr. R. H. DERBY.

Dr. SWAN M. BURNETT, of Washington, D. C., has been elected ophthalmic surgeon to the **"Garfield Memorial Hospital."**

The **triennial prize,** funded by the late Prof. v. Wells, for the best paper in **Graefe's Archives,** has, for the years 1878–1880, been awarded to Prof. B. v. GUDDEN, of Munich, for his researches on the decussation of the optic nerve fibres in the chiasm.

Fig. 1.

Fig. 2.

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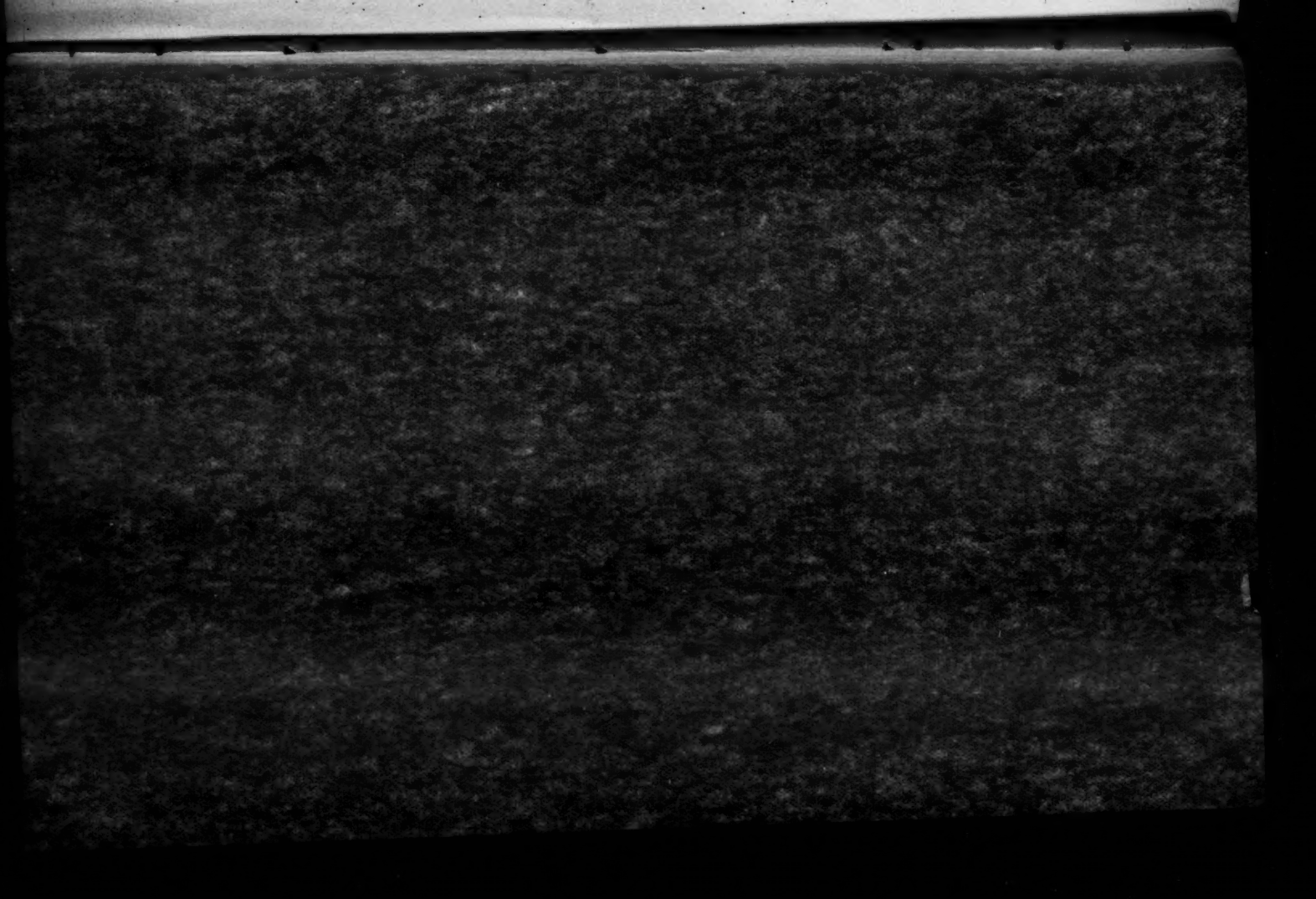

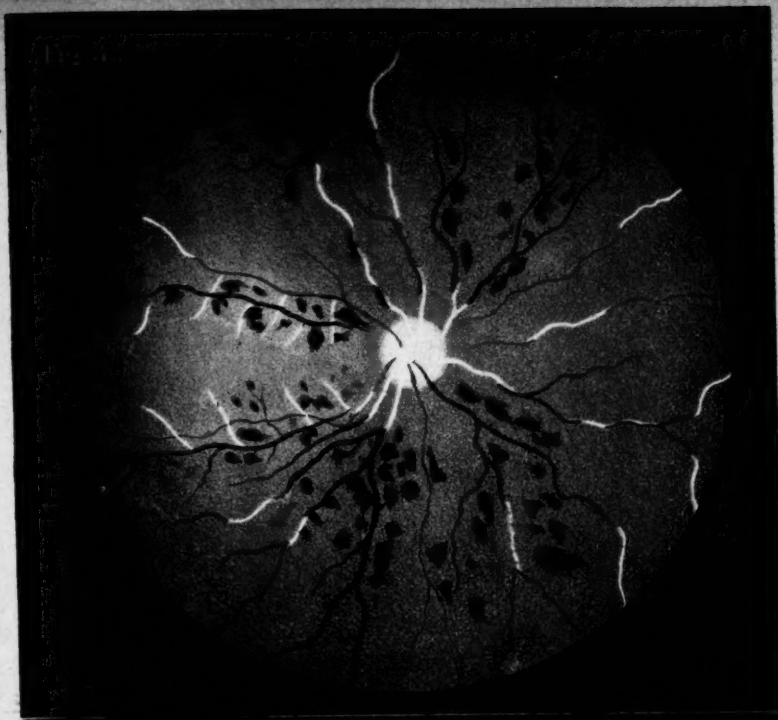

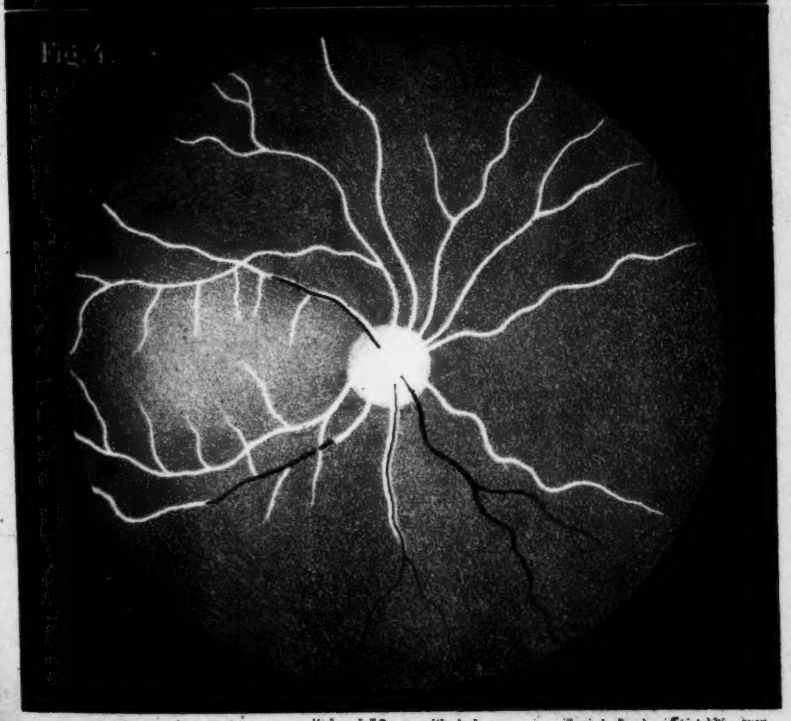

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